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THE NORTHERN CHEYENNE TRIBE
AND
ENERGY DEVELOPMENT IN SOUTHEASTERN MONTANA

Volume II

Decision Information System Design

and

Preliminary Economic and Demographic Analysis

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September 1977

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CHAPTER I

INTRODUCTION & SUMMARY

This report is submitted to the Northern Cheyenne Tribe through the Northern Cheyenne Research Project (NCRP) as a presentation of the results of work done by the Rho Corporation (Rho) under its subcontract with the NCRP to perform the economic part of the NCRP's socio-economic research contract with the Old West Regional Commission. This chapter introduces and summarizes the report. It contains the following: Section I discusses the two purposes of the work done by Rho for the NCRP: (1) the design, for future implementation, of an information system whose purpose is to provide information for use by Tribal members and officials in making important decisions about future economic developments and planning for the impacts of such developments, and (2) the preliminary analysis of three such potential developments in terms of both (a) their feasibility, in a strictly economic--dollar revenues and dollar costs--sense, and (b) the economic impacts these potential projects would have on the Reservation if they were actually developed. It must be pointed out here, and will be emphasized several times in this report, that Rho's concentration on economic considerations does not mean that the Tribe should only be concerned about these economic issues. Other extremely important areas of concern must also be carefully weighed and balanced against economic benefits and costs when

reaching decisions about the desirability or undesirability of alternative potential economic development projects. The information system designed by Rho and reported on in this document includes these other elements under the names "social-cultural considerations" and "physical environmental considerations." Social-cultural and environmental analysis are outside the realm of expertise of Rho personnel and thus are not discussed in detail in this report. The staff sociologists and geologists-hydrologists-land use experts of the NCRP are responsible for the analysis of the social-cultural and physical environmental effects--good and bad--of potential developments. Again, for emphasis, it must be remembered that careful mature judging of Tribal members and officials of the costs and benefits in all three areas of concern must be the basis of decisions among potential development alternatives. The purpose of the decision information system discussed in this report is to provide information about economic, social-cultural, and physical environmental effects--desirable and undesirable--so that Tribal decisions can be based upon realistic views about the effects of each alternative.

Much detailed information has been collected and a substantial amount of detailed technical work has been carried out in the completion of this project. This situation presents the authors with a problem in terms of preparing a report which effectively communicates the information and implications to readers with a wide variety of interests. Some readers will be interested in virtually all the detailed information

and analysis covered in the project. Other, and probably most, readers' interests will be more limited. Some will wish to see full details about only one or a few limited areas of the work while still others' needs would be best met by a broad overview statement of the general problems addressed and results obtained with little or no discussion of analytical or information detail. Experience has indicated that a "layered" approach to report structuring is an effective method for dealing with the need to present completely detailed information on the one hand and the need to present information in useful form to non-technicians who have little or no interest in (or time for) detail at the other, while accommodating those whose interests lie between these extremes. By "layered approach" it is meant that three different discussions of each component of the project are presented. These range from the most general, least detailed layer through a more detailed layer designed for those with more time to spend and interest in certain areas, to a most detailed layer addressed to technicians and using technical and mathematical language to express ideas and arguments. In each layer, the reader is provided references to the location of discussions of each topic appearing in other layers.

The layered format does impose extra work on those whose interests lie at the detailed technical end of the spectrum, but this seems to be a reasonable cost to impose in order to maintain the interest and meet the needs of those at the other end. This is true especially since

the interests and needs of agency and Tribal policy personnel, who must be able to use the information presented if it is to be useful, tend to lie at the non-technical, non-detail end of the spectrum.

In this report, the first, most general and least detailed, layer of discussion is presented in the present chapter. The intermediate layer is presented in Chapters II, III, and IV, below. Finally, the layer presenting a completely detailed discussion is presented in the rather lengthy series of appendices following Chapter IV.

The remainder of Chapter I is organized as follows: Section II presents in general terms the nature and purposes of the Decision Information System whose design for future implementation at NCRP constitutes the heart of Rho's efforts. Section III presents findings of some preliminary analysis of the feasibility and impacts of three potential economic development projects--two dealing with coal mining on and near the Reservation and the third with off-Reservation grazing--selected by NCRP personnel as of immediate interest to the Tribe. These analyses present only "first cut" type information. They would require further work to develop highly reliable conclusions, but they do provide good first cut implications and they do present examples of the kinds of information NCRP would have the capacity to provide the Tribe as needed concerning future potential economic developments. Finally, Section IV outlines the remaining chapters of the report.

A. PURPOSES OF THE PROJECT

The Northern Cheyenne Tribe currently faces some agonizing choices concerning the future economic welfare of the Tribe and its members and, indeed, concerning the very existence of the Northern Cheyenne as separate, unique people continuing in their traditional values and ways of life. On the one hand, currently increasing reliance of the United States on its Western coal reserves to meet its future energy needs gives the Tribe the opportunity to exploit the coal deposits underlying much of the Reservation in such a way that, if done carefully, the economic well being of the Tribe and its individual members would be greatly enhanced. This opportunity is, of course, viewed as extremely attractive by the Tribe in view of the life of poverty which has been the lot of most Northern Cheyenne since the establishment of White dominance.

On the other hand, deep feelings of uncertainty arise in considering decisions about whether and how to undertake coal development. Will the Tribe and its members actually benefit financially from such a development or will the incomes as well as the coal flow to Whites living far from the Reservation? What will be the effects of such a development on life on the Reservation? How many more people will move into the area? What will they be like? Where will they live? Will their influence be greater than that of the Northern Cheyennes who have always lived in the area? Who will get the good jobs? Where will

the stores and businesses to serve these people be located? Who will own them? What will happen to prices of goods the Northern Cheyenne must buy to live? Who will provide needed governmental services? How will these be financed?

There will certainly be benefits from such developments and there will certainly be costs. What are the benefits and who will receive them? What are the costs and who must bear them?

From the point of view of the Northern Cheyennes who must, soon, make decisions which will influence the welfare and even the existence of the Tribe over the next 100 years or more, the question is: Do the benefits to the Tribe and its members outweigh the costs which must be borne in order to acquire these benefits?

Another question which arises from this line of thinking is: What development options or alternatives does the Tribe have to choose among? These alternatives are not only confined to coal development options but also to developments, such as expanded forestry operations, off-Reservation grazing, etc., which do not involve coal at all. Perhaps in the final judgement, a less economically beneficial development may prove more desirable if it has less negative impact upon continuation of traditional Northern Cheyenne ways of life and the environment of the Reservation.

Once other potential economic development options are identified, the same questions about their economic, social-cultural, and environmental

impacts as were discussed above concerning possible coal development arise again. Thus, the hard job of reaching wise, well thought out decisions about current developments in terms of their current and future costs and benefits is seen to be an extremely difficult and at the same time an extremely important one. This decision making task is the responsibility of Tribal officials and, through the intended use of the referendum, the entire Northern Cheyenne people. This is as it should be. No group, and especially no group of non-Indian outsiders should be entrusted with this vital function. What, then, is the purpose of the NCRP and the work done by the Rho Corporation? In general terms, that purpose is to provide information about some of the questions listed above about potential economic developments. In this way, those who must make these crucial decisions will be able to base them upon reasonable understandings about how great the benefits from each alternative are, how high the costs are, what the nature of these benefits and costs are, and who will receive the benefits and bear the costs.

With this information, honest disagreements among Tribal members will continue to exist. There will still exist the trade-offs between the benefits of development on one hand and the costs development imposes on the other. Individual values, attitudes, and opinions will still vary. Each person will have his own view about what and how much should be given up in order to increase personal and Tribal economic well-being. The role of information here is to indicate for

each potential economic development being considered what the effects of the developments will be on economic, social-cultural, and environmental conditions on and near the Reservation. With this information, each person can decide his own preferences for or against a given development. Then, through careful, thoughtful discussion and deliberation based upon individual values and upon information about development alternatives, wise choices can be made which will serve the best long term interests of the Northern Cheyennes in terms of their economic well-being, the continuation of valued social and cultural traditions, and preservation of the physical environment of the Reservation.

Thus, the purpose of the Rho Corporation's efforts is to provide information relevant to Northern Cheyenne decision making and planning. This purpose was pursued along two paths. The first, and in Rho's opinion, the most important, is long term in nature. It is the design for permanent installation at NCRP of an information system which will provide the Tribe with the ability to collect, organize, analyse and distribute information relevant to important development and planning issues. This information system, if installed, would be a permanent resource of the Tribe. It would be operated by NCRP staff researchers and would rely as little as possible upon costly outside expertise. It is seen as forming an important, permanent part of the Northern Cheyenne Tribe's overall decision making and planning processes. Rho has been

responsible for an overall design of the decision information system and for the specifically "economic" elements of the system. The overall purpose of the system has been discussed above. The specifically economic elements, which will be discussed in detail in following sections, chapters, and appendices, include (1) the collection and evaluation of economic data concerning past and current conditions on and near the Reservation, (2) the creation of an economic feasibility analysis capacity which would permit the Tribe to determine whether projects being considered for development are likely to prove feasible in the narrow sense of being able to generate enough revenues to cover operating and capital costs, (3) the design of an economic impact projection analytical capacity which would permit the NCRP to analyse the economic impact on the Reservation of alternative developments. These impacts would include: population increases, employment increases, housing requirement increases, income increases, Tribal revenue increases etc. As was indicated above, these are important elements in deciding on the desirability or undesirability of a potential project. Rho's efforts are designed to provide the ability to generate this important information. Impacts on social-cultural and physical environmental conditions expected from potential developments are equally important. These areas are the responsibility of NCRP staff researchers in these fields.

The second aspect of the Rho Corporation's efforts to provide decision information for the Northern Cheyenne consists of carrying out

preliminary analyses of the feasibility and economic impacts of three potential economic developments on and near the Reservation. These analyses are, as they were intended to be, preliminary in that they would require further work before great reliance should be placed on the details of their findings. At a broader level, however, they do provide good "first approximation" information and especially, they do present the Tribe with information about what general types of development projects may be reasonable for them to pursue and what general types and levels of impacts to expect.

An important point about these preliminary analyses must be made here: The analysis of the project in terms of its feasibility and potential economic impacts does not indicate a desire to plan and carry out the project. As an example, the analysis of a large scale coal mine for sale of coal to the Midwestern market does not indicate a committment to that project. Rather, it indicates a recognition that the Tribe is in a position to exploit its coal reserves if it is found desirable to do so. This desirability issue is what is addressed by the analyses. The determination that such a project is probably economically feasible; i.e., that it could make a profit, does not imply that it is desirable from the standpoint of its total effect on Northern Cheyenne life. It may be that the other effects of the project--the number of people that would move into the area, the possible negative effects on the air and water of the Reservation, the sharing of the

profits between the Northern Cheyennes and outside financiers, developers, etc.--would be viewed as so undesirable that the Tribe would decide to forego the substantial monetary benefits available from the mine in order to avoid the costs. Again, the purpose of this research is to provide information upon which the Tribe can base decisions, not to make decisions for the Tribe.

B. NATURE AND PURPOSE OF THE DECISION INFORMATION SYSTEM

This section will briefly summarize, in general terms the organization and functioning of the decision information system whose purposes have been discussed above. The question here is how would the system be organized and how would it work to respond to the decision information requirements of the Northern Cheyenne people? Following this, discussion will return to the question of the purposes of the system by presenting examples of how it would serve decision and planning needs of specific agencies and programs.

1. General Description of the Decision Information System

The following flow chart (FigureI.1) presents a schematic overview of the system and its functioning. The three central circles represent the three main components of the system: (1) Preliminary Analysis (2) Feasibility Analysis, and (3) Impact Analysis. As can be seen, the primary user of the system would be Tribal planners-decision

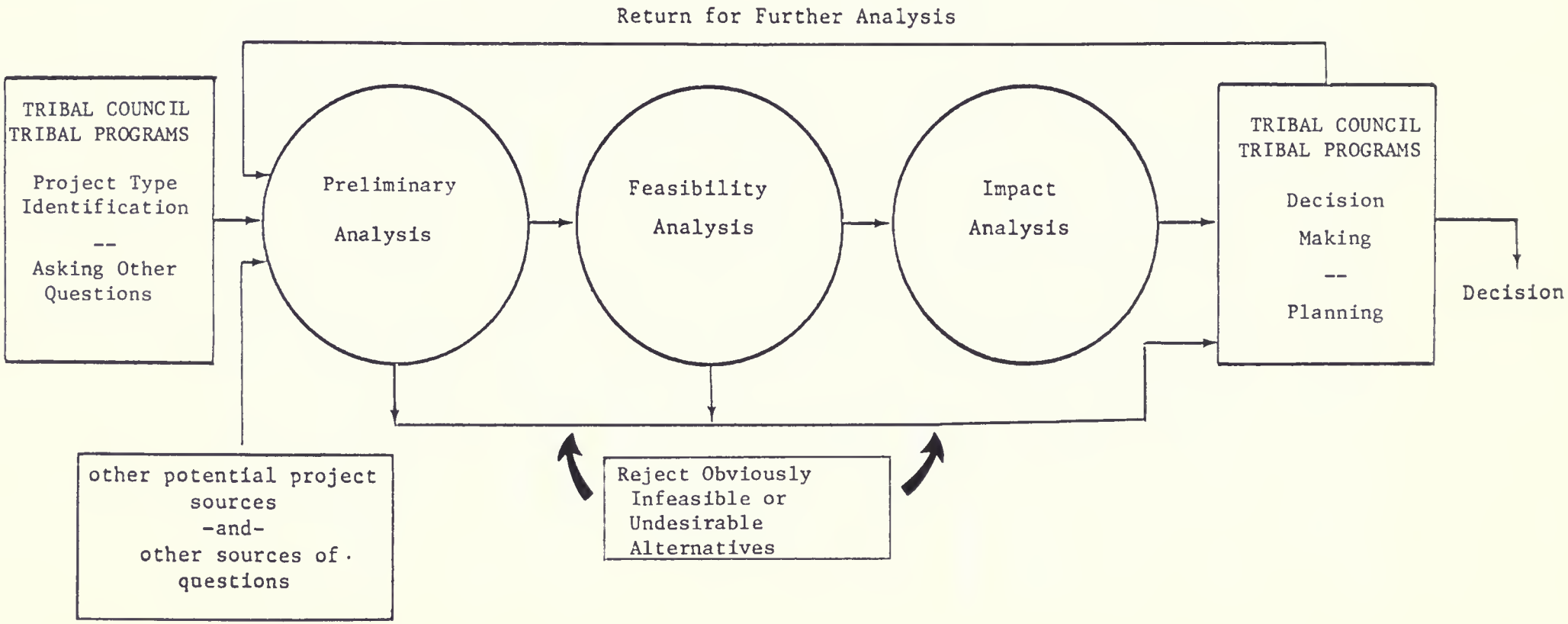
makers, usually the Tribal Council or Tribal programs. It may be desirable to provide service to other users such as the BIA, etc. It is intended that all Tribal members would be served by the system, but in an organizational-operational sense such use would probably have to be channeled through the Council and/or Tribal programs.

From the rectangular box on the left, inquiries and requests for information and analysis about potential development projects or, in fact, any other issue of concern, enter the system. This process is simply the asking of questions by Tribal officials (and possibly others) about issues which appear important to them and about which they recognize they do not, as yet possess sufficient information to reach well thought out judgements and decisions or to prepare rational plans. It then becomes the responsibility of the NCRP through the information system to attempt to answer the questions asked. The schematic presented in the figure and discussed here is designed primarily for provision of information about potential development projects. It should be pointed out, however, that the system can also be used to produce data and analysis which are not related to specific development alternatives. An example of this is the population projection capacity which has been used to provide projections of future Northern Cheyenne populations by age and sex in the absence of any major economic development, but under different assumptions about future birth and death rates. These projections have proved interesting and useful for many

Figure I.1

NORTHERN CHEYENNE RESEARCH PROJECT DECISION INFORMATION SYSTEM

Schematic of the Proposed Decision Information System



purposes even though they are not concerned with the impacts and effects of economic development alternatives. The information system should be able to respond to a variety of such questions. It is not limited just to the specific types of questions emphasized in this report.

Once the questions have been asked and the type of project to be considered by the researchers established, the information system is used by the researchers to attempt to analyze the feasibility and impacts of such developments. The first step in this process is represented by the circle labeled "Preliminary Analyses." This step represents both a sort of initial investigation of the nature of the project type being considered and an initial screening of them with the intent of identifying projects whose ability to cover costs is obviously questionable or whose economic, social-cultural, or environmental impacts would obviously be so undesirable that further research (in terms of the following two circles) would not be worth the cost involved. An example of this is provided by the preliminary feasibility analysis done on the question of off-Reservation grazing on federal lands. In that investigation, it was discovered that, under current Bureau of Land Management and U. S. Forest Service policies and practices, little hope could be held out for the possibility of the Tribe's gaining the required grazing rights on nearby federal lands. Thus, it was concluded that further research into this question should be discontinued. Only if the Tribe decides it wishes to undertake the lengthy and costly

legal contest required to attempt to secure required rights or decides to attempt to purchase private lands to which such rights are, in a practical sense, attached, should research on this type of project be continued. If such a decision is made, the Tribal Council would ask the NCRP to look further into the feasibility and impacts of the project as represented by the "Return for Further Analysis" arrow.

Projects which are not found in preliminary analysis to be obviously questionable in terms of either their feasibility or the undesirability of their economic, social-cultural, and/or environmental impacts are then advanced to the next stage of the process, that represented by the "Feasibility Analysis" circle. It should be pointed out that after the preliminary analysis is completed and before further work is done, a report on the preliminary findings should be made to the Council and other interested Tribal members so that they may be kept informed. This is important since the decision to undertake the development or not must remain with the Tribe and they must be kept informed especially about tentative findings of infeasibility or major undesirable impacts produced in the preliminary analysis stage.

In the feasibility analysis stage, the narrow question of the potential economic profitability of the proposed project is investigated. Here, the issue is whether the project will be able to generate sufficient revenue from the sale of its products to cover the costs of buying machines and equipment, buying supplies, borrowing money to cover start

up costs and operating costs, paying wages and salaries, etc. The feasibility analysis stage seems essential as part of the process for two reasons: (1) The Tribe is considering undertaking several economic development projects on its own initiative. The feasibility analysis stage would be very useful in selection and planning of these projects. (2) Outside developers frequently approach the Tribe with proposals to develop Tribal resources. The ability of the Tribe to determine the feasibility of these proposals would allow the Tribe to devote serious attention only to those which have a chance of being successful.

Again it must be emphasized here that feasibility analysis provides only part of the information required for development planning and decision making. Feasibility analysis can tell the Tribe which projects would most likely prove successful from the point of view of making a profit and which would not. Of those projects which would probably be profitable, feasibility analysis tells little if anything about their other economic, social-cultural, and physical environmental effects. These effects are analyzed and projected into the future in the last stage of the process represented by the "Impact Analysis" circle in Figure I.1.

Figure I.2 represents an expanded schematic view of the impact analysis component of the overall information system. When a potential economic development project has been determined to be feasible; i.e., the development will probably be able to cover its costs out of revenues from the sale of its products, it enters the impact analysis stage as

indicated by the small arrow on the left of the circle. The purpose of this stage is to analyse the project with respect to the effect it would have on important aspects of Northern Cheyenne life on and near the Reservation. These effects, or impacts, are, as indicated earlier, broken down into economic impacts, social-cultural impacts, and physical environmental impacts. It is essential that the Northern Cheyenne have information about all three types of impacts because all three are profoundly important to the overall well-being of the Tribe, the happiness each individual member of the Tribe finds living on or near the Reservation, and the very survival of the Northern Cheyenne as a separate people whose life style is based upon traditional values and ways of living.

The unfortunate but unavoidable fact is that any project which proves feasible in the feasibility analysis stage will be found to have both desirable impacts (benefits) and undesirable impacts (costs) in the impact analysis stage. (It may be that some project will have only benefits or only costs, but this is so unlikely that it is not considered here.) The hard job of economic development decision making is centered upon identifying what desirable impacts will be produced and what undesirable impacts will be produced and then deciding, based upon the values and goals of the Tribe, whether the benefits (desirable impacts) outweigh the costs (undesirable impacts). If they do, it would be in the Tribes best interest to undertake the project in

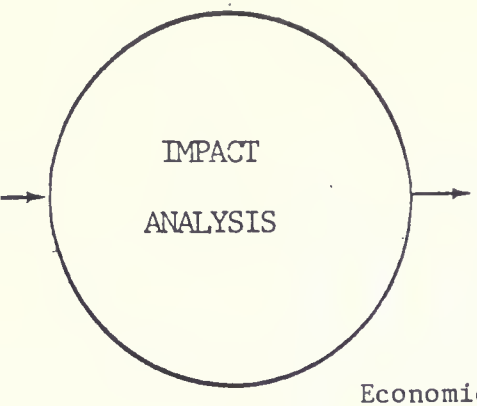


Figure I.2

Schematic of Impact Analysis stage

	Economic Impacts	Social-Cultural Impacts*	Physical Environmental Impacts*
Direct Project Impacts	Employment by occupation Northern Cheyenne training requirements Additional labor force requirements Payroll incomes by occupation Tribal revenues from leases, royalties, etc.	Social well-being effects Satisfaction Health Welfare Public Safety Social Organization crime alcoholism racial conflict family instability community organization Tribal government, etc. Educational, recreational opportunities Socio-economic options Effects on culture change Values Language Traditional activities Institutions Sacred places	Effects on environmental quality animals plants water air land Effects on aesthetic landscape air/water aesthetic man-made objects
Indirect Induced Impacts	Population (age, sex, race) Migration (age, sex, race) Employment (industry, occupation) Income to individuals Unemployment rate Housing Requirements School age populations Public service requirements Revenue to Tribe		

* List developed by Eric Natwig "A Method for Evaluating Proposed Navajo Development Projects: Criteria and Weights for Investment Decision." Office of Program Development, Window Rock, Arizona.

order to receive the benefits, but knowing that the costs, or undesirable impacts, must be accepted also. If the benefits do not outweigh the costs from the point of view of the values and objectives of the Tribe, then the project should not be undertaken. In this case, the Tribe would decide that the benefits--which might be very large money incomes for the Tribe and its members--are not worth the costs that would have to be accepted to receive those benefits. In some cases those costs could consist of the virtual destruction of the Reservation as a Northern Cheyenne Tribal land base and, in fact, the elimination of the Northern Cheyenne as separate people. In other cases, the costs may not be so extreme, but still large enough that they outweigh the benefits of a specific project.

This discussion illustrates again the importance of the decisions being made and the difficulty of making them. Also, it explains why the Tribe has adopted a very cautious "go slow" policy on making such decisions. The Tribe wants as much information as possible before being willing either to commit the future of the Tribe to any specific development or to reject as too costly even any development alternatives which may hold out the prospect of virtually certain economic prosperity. It is the purpose of the information system to provide such information and of the impact analysis phase to analyse the economic, social-cultural, and physical-environmental impacts of the various development alternatives.

Attention will now be turned to the specific types of information to be developed in the impact analysis stage to measure the impacts of potential economic developments. Referring back to Figure I.2, it is seen that such impacts are divided into three general categories: economic, social-cultural, and physical environmental. Within each general category, specific elements are identified for examination. In the economic impacts category, for example, some of the elements to be analysed are: Direct Project Employment by occupation, Direct Project Tribal revenues from leases, royalties, etc., Indirect-Induced Population (changes) by age, sex, race, Indirect-Induced Income to individuals, etc. Each of these will be discussed briefly below. It must be remembered that the expertise of the Rho Corporation is limited to the economic impact category. Thus, the elements listed in the social-cultural and physical environmental categories have been suggested by NCRP staff researchers in those areas. An analysis of Tribal members' principal concerns about the social-cultural and physical environmental impacts of coal development are presented in Volume I, Chapter IV. Further analysis of social-cultural and physical environmental impacts can be found in the Northern Cheyenne Air Quality Redesignation Report and Request, prepared by the Northern Cheyenne Tribe for the Environmental Protection Agency, Region VIII, Denver, Colorado.

Returning to the economic impacts category, it can be seen that these are broken down into two sub-categories: (1) Direct project impacts

and (2) Indirect-induced impacts. This breakdown is for analytical convenience only. It does not indicate that either subcategory is more or less important than the other.

Direct project impacts refers to those impacts resulting from the development being considered itself. Indirect-induced impacts are those impacts which the proposed development would cause to come about (i.e., induce) in the area, but which are not part of the development itself. For example, if the Tribe were considering the possibility of a major Tribally financed and operated lumber mill near the Reservation, the direct impacts of the project would include: (1) employment in the mill and supporting operations, such as truck driving, etc., (2) the number of Northern Cheyenne that would have to be trained to take these jobs or as many of them as possible, (3) the additional non-Cheyenne labor force required to fill jobs for which no Northern Cheyenne are available or could be trained (the occupational breakdown of direct project employment is obviously important here), (4) payroll incomes to direct project employees, and (5) revenues to Tribal government from profits produced by operating the mill.

The direct project impacts discussed in the preceding paragraph are obviously important considerations in evaluating the desirability or undesirability of the potential economic development project being considered. But they are far from being all the impacts to be expected. As a result of the new direct impact jobs, more money is in the hands

of those who have the jobs. Also, to the extent that non-Cheyenne outsiders are required to fill some direct project jobs, more people will move into the area. Thus, both from the indigenous Cheyenne population who get jobs in the projects and from people moving in to take jobs not filled by Cheyennes more goods and services will be demanded, more government services will be demanded, etc. These increased demands, then, cause employment to increase in local stores, banks, etc. They require government agencies, including Tribal programs, to expand to provide more services. They cause an increase in housing construction activity, etc. These increases begin the induced impacts of the project. For all those who participate in these induced effects, their own incomes increase and they in turn, induce another "round" of demand for more and/or better goods, services, housing, etc., and induce still further growth. There is, of course, a limit to the extent of those rounds of growth induced by any initial project. The point is that the induced response to the direct project impacts will usually be significant and may, in some cases, be larger than the direct project impacts that caused them. Thus, the indirect-induced impacts are at least as important and considering the desirability or undesirability of a potential economic development project.

In Figure I.2, the following are listed as the important indirect-induced economic impact measures. (1) Population broken down by age, sex, and race on and near the Reservation is possibly the single most

important measure of the impact of an economic development, especially in an area which has a small population base to begin with. (For convenience, the population effects of direct project impacts are grouped with those of the indirect-induced impacts for analysis.) (2) Migration will constitute the most variable part of population increases in response to development projects. It is important to know how much migration to expect not only as part of analysing total population impacts, but also because of the fact that migration into the area represents, to a large extent, the increase in non-Cheyenne outsiders to be expected. This is important in terms of social-cultural impact analysis. (3) Employment by industry and occupation, along with (4) income to individuals from such employment, can be viewed as the "connecting link" between direct project impacts and indirect-induced impacts. Remember that this employment and income does not involve the development itself, such as the saw mill in the example above, but rather the employment in stores, banks, government agencies and programs, etc., which are induced in the area by the development. (5) The unemployment rate is a good measure of both economic opportunity and the ability and willingness of people in an area to take advantage of such opportunities. (6) In terms of magnitude of problems created by an economic development project, the effect on housing demands is often the most critical, again especially in areas with a small housing stock to begin with. In both deciding on the desirability or undesirability

of a potential economic development project, the impact of the project on the local housing market must be given serious attention. Also, if a project is found to be desirable and is to be undertaken, planning for meeting resulting housing needs on both a short run-temporary and a more long run-permanent basis must be given a high priority. (7) One of the most important government services is education. Thus, projection of impact of the project on school age populations is extremely important, both to the desirability of the project and to planning for the impacts of any project which is to be undertaken. (8) Other public services which would be affected by the project include police, public health, mental health, etc. The impact of the project on each of these is important to both evaluation of the project in terms of costs it would impose and to planning for the impacts of any project selected as desirable and actually undertaken. (9) Finally, there may be some impact on Tribal revenue related to the development, but not directly generated by it in the form of profits, in the example above, lease payments, royalties. These may take the form of taxes, if it is determined that Tribal governments have taxing authority, recreational permit fees, etc. To the extent that the Tribe has authority to impose such levies, the induced impact of the development on the revenues generated by them could be significant as a source of financing to meet costs imposed by the project.

An important point about all three analytical stages of the decision information system--preliminary analysis, feasibility analysis, and

impact analysis--must be made here. This point is the obvious one that these analyses are carried out about events which have not occurred as yet and, in fact, may never occur. What is being analysed is the feasibility and impact of potential economic development projects well before any work to implement such a project is undertaken. The purpose is to provide information about the potential project before it is carried out so that the Tribe can determine whether it would be in their interest to undertake or encourage the project without having to actually experience the benefits and costs of the project. But again, the information is about potential future conditions.

The importance of this obvious future orientation of the analysis is that it makes the implications produced from the research uncertain in terms of both the feasibility and types of magnitudes of impacts. Because the work is concerned with an event which has not actually occurred the analysis may inadvertently, either (1) fail to include some element which significantly affects either the feasibility of the project or its impacts on residents of these or both, or (2) it may incorporate assumptions about some aspects of the project itself or indirect-induced responses to it which do not realistically reflect what would actually occur if the project were undertaken. Uncertainty of this sort cannot be eliminated from future oriented research and analysis of the sort included in the information system. Both the researchers carrying out the analysis and the Tribal members and officials using the resulting information must bear this in mind at all times. This

caution about uncertainty does not, of course, indicate that the results of feasibility and impact analyses are not good indicators of these aspects of potential development projects. Rather, it means that the analyses produce the best possible estimates of future feasibilities and impacts. While there will probably be differences from these implications if any project is actually implemented these differences should be rather small.

2. Further Discussion of the Purposes of the Decision Information System

Perhaps the several pages of discussion earlier in this chapter has adequately introduced and developed the role of the information system in Tribal decision making regarding the issue of the feasibility and desirability or undesirability of various potential economic development projects. This topic will not be further discussed here. In this section, a brief introduction of the role of the information system as part of the planning and decision making processes which are part of the day to day operation of Tribal government is presented.

Potential users of the proposed information system on the Northern Cheyenne Reservation include virtually all persons concerned with Tribal decisions. Obviously, the Tribal Council and President are involved in major decisions which will have far reaching impacts on the well-being of the Tribe and its members. Perhaps the most obvious of these are economic development decisions of the type discussed

earlier. However, these officials are responsible for other major decisions such as the decision to undertake the EPA Class I air designation effort. Still another major responsibility of top Tribal officials is the setting of priorities among Tribal programs and establishing new programs to meet new or newly recognized needs of the Northern Cheyenne people.

At a different level, much planning and decision making of both a policy and a day to day operational nature is the responsibility of the functional agency heads and directors. It is the function of these people to administer their programs so that agency spending produces as much service to the people as possible, or perhaps, that required services are provided at the lowest possible cost. In order to do a good job of planning for their programs' future functioning, program administrators require substantial information. For example, the Community Health Representatives (CHR) program should expect to be required to concentrate on a different set of health problems if a significantly younger population is established on the Reservation as a result of either decreased out-migration, or of in-migration, resulting from some major development project than they would face if an older population is expected to result from continued out-migration of many of the younger generation due to lack of economic opportunity. Similarly, the problems the CHR program should plan for will vary with expected personal incomes, changes in public sanitation systems, etc. Finally the resources this program will have to work with might be

substantially higher with a development project than without it and this should significantly influence program planning and decision making.

Also, on the Reservation are such agencies as CDC and EDA whose purpose is explicitly to promote economic development on the Reservation. Information regarding both the economic feasibility of proposed developments and the nature and extent of their impacts on Reservation economic, social, cultural, and physical environments should be essential in guiding these agencies' decisions.

Finally, since it is they who will ultimately receive the benefits and pay at least some of the costs of most Tribal decisions, especially the social-cultural and physical environmental costs discussed earlier in this chapter, Tribal members at large must play a role in decision making. While this role may not always be a direct one, it should always be based upon good information. In some cases, direct participation may be called for as in the case of a prospective Tribal referendum on coal development. Here especially, an electorate informed on both the economic feasibilities and the social-cultural, environmental, and economic impacts of proposed alternative courses of action is essential to arriving at a wise choice through the referendum.

Thus, even though economic development decision making is an extremely important use to which the information system can be put, the system should also become an essential part of Tribal governmental planning and decision making at both the general policy-priority setting

level (Tribal Council and Tribal Chairman) and at the program level. The need to produce information on a routine basis for both these uses is the reason why the NCRP and the Rho Corporation as its contractors, have concentrated on designing a system which could be installed at the NCRP and operated on a day to day basis as a continuing information-research-analysis resource of the Northern Cheyenne people and their Tribal government. The following section of this chapter summarizes the specific research and analysis efforts of Rho in this project. This summary both (1) presents useful first cut analysis of the issues addressed and (2) provides illustrations and examples of the kinds of information the information system will provide to support Tribal planning and decision making if it is actually implemented at NCRP.

C. PRELIMINARY ANALYSIS

This section provides a summary of the investigations and analyses undertaken by the Rho Corporation in completion of the second major purpose of its work for the NCRP, the preliminary analysis of specified economic development alternatives in terms of their feasibility and the economic component of their impact on life on and near the Reservation. It must be emphasized here that, except for the Indian population projection work, the analyses reported upon in this and following chapters are preliminary in nature. They are not produced

through rigorous application of the feasibility and impact analysis procedures designed as part of the decision information system, but rather used only parts of these as the designs and supporting data became available. If the information system is, in fact, installed and made part of NCRP's overall research and analysis functions, future work will be carried out by NCRP staff utilizing these analytical tools.

Investigations and analyses completed can be organized into four categories for this summary presentation: (1) investigation into data sources available for incorporation into the information system, (2) participation in the identification-specification of potential economic development projects to be analysed, (3) carrying out of project feasibility analyses, and (4) carrying out of analysis of the economic component of project impact analysis--remember that social-cultural and physical environmental impact analyses are the responsibility of the relevant NCRP research staff.

1. Data Sources

The basic raw material of any information system which is intended to provide numerical information about current and potential future conditions is the data incorporated into the system. There are two basic types of sources of data: (1) primary research and (2) collection of data from secondary sources. Primary research

consists of surveys--such as the NCRP household, business, and government agency surveys--and census--such as the Tribal census also conducted by the NCRP. Primary research is intended to generate data which does not exist before the survey or census is carried out.

Secondary data sources are agencies, usually federal, state, or local government agencies, which collect data for the major purpose of supporting the administration of agency programs. Thus, for example, information about primary education can be obtained from administrative records of local school boards; information about county employment can be obtained from state departments of employment security and the Federal Bureau of Economic Analysis; and a large volume of detailed data on area's population and economy is available from the U. S. Census Bureau.

Both primary and secondary sources offer advantages. Primary research can be designed to produce data which is tailored specifically to the needs of the research to be carried out, but it tends to be much more expensive than reliance on secondary sources and, since surveys and censuses are not usually carried out yearly, they do not produce a history of relevant changes over time. This is partly true even of the decennial U. S. census since the questions, coverage, and reporting details vary from census to census and also the ten year interval is too long for many purposes. Data from secondary sources usually is much simpler to collect than is primary data and is less

expensive than are primary research projects. Secondary sources also provide data on a routine timely basis that does provide a history of how conditions develop and change over time. The major difficulty with data from secondary sources is that it often does not provide exactly the information required by a particular research task. This is because the data is collected primarily for agency administration purposes and information not required for administration does not appear in the data. An especially troublesome example of this type of difficulty is the absence of racial breakdowns in Montana State and Bureau of Economic Analysis employment data. Thus, while these agencies provide good information on both total employment in Rosebud and Big Horn Counties and its industrial detail, they do not deal with the question of employment of Northern Cheyennes or other Indians. For many purposes, of course, the absence of racial detail would not be important, but the usefulness of these sources to the Northern Cheyenne would be much greater if Indian employment could be identified.

During the talks which resulted in the Rho subcontract with the NCRP, it was agreed that both primary and secondary sources would have to be used in the work of NCRP's socio-economic section. NCRP staff was to carry out primary research in the forms of a household survey, a business survey, and a government agency survey. Rho was to investigate federal, state, and local government agencies as secondary sources of required data and evaluate each source identified

in terms of the usefulness of its information for NCRP's purposes.

Due to unfortunate delays in survey design and administration, results of the surveys did not become available in time to be fully incorporated into the work. It is intended that, if NCRP implements the decision information system discussed in this report that the surveys will form an important part of the data base upon which the system is to be based. The results of the surveys appear in the "Statistical Handbook" prepared by the NCRP. These will not be further discussed here.

The main purpose of Rho's investigations into secondary data sources has been to identify sources which can provide routine data inputs into the NCRP decision information system and to evaluate these in terms of their usefulness in that system. Thus two kinds of information were generated from these investigations: (1) the data themselves--i.e., the number of employees, number of school enrollees, etc.--, and (2) a description and evaluation of each data element and its source. Both types of information are presented and summarized in following chapters and appendices. In those chapters and appendices, much information is presented which has not been put to use in the analyses carried out in this project. It is thought important to include this type of material as part of the information system because not all requirements of that system can be foreseen at this time. In the future, as those who operate the system for the NCRP need more

and different kinds of data, they can refer to this material for guidance about where to look and where not to look for additional secondary source data. In other words, from the point of view of designing and operating a decision information system, it is essential to have information about information as well as to have the information itself.

In this chapter, it would be inappropriate to introduce each secondary source investigated or to present detailed discussions of collected data or the data themselves. Rather, only brief statements of the most important types of information collected from secondary sources will be presented.

a. Indian Population on the Northern Cheyenne Reservation

Table I.1

Indian Population on the Northern Cheyenne Reservation

Year	Male	Female	Total
1970*	1101	1255	2557
1976**	1433	1406	2839

* Source: Subject Report - American Indians (PC(2)-1F) U. S. Department of Commerce, Bureau of Census Washington, D. C., 1973.

** Source: 1976 Northern Cheyenne Tribal Census conducted by the Northern Cheyenne Research Project.

It must be noted here that the 1970 census tended to undercount all Indians. Thus the 1970 figures in Table I.1. are probably low and the indicated increase from 1970 to 1976 is probably overstated. Nevertheless the figures do indicate a significant population increase over this six year period. This increase, if continued, will impose significant new problems on the Reservation economy and the Northern Cheyenne Tribal Government.

b. Vital Behavior (births and deaths)

Several secondary sources of birth and death records for Indian groups which include the Northern Cheyenne were identified and evaluated. Rather than discuss them or list any particular one as the "best" source, summary will be presented here of the final estimates of fertility rates and survival rates estimated from these various sources and used in the population projections as discussed below and in following chapters.

The term "fertility rate" represents an estimate of the number of children a woman in a given age group will probably give birth to in a given period of time. Technically, fertility rates are defined as the number of live births occurring to women in a given age group during a given period of time divided by the average number of women in that age group during that period. The ages 15-44 are usually

considered to be the ages during which most women bear most of their children and thus are called the fertile years. For purposes of this project, the population is broken down into five year age groups. Thus, fertility rates have been estimated for the age groups 15-19, 20-24, ..., 40-44. Also, because of the requirements of this project, five year intervals are used. Thus, the rates appearing in Table I.2. and Figure I.3 represent the number of children each woman in each age group will probably give birth to over a five year period.

Figure I.3

1970 Montana Indian and Montana Total

Five Year Fertility Rate Estimates

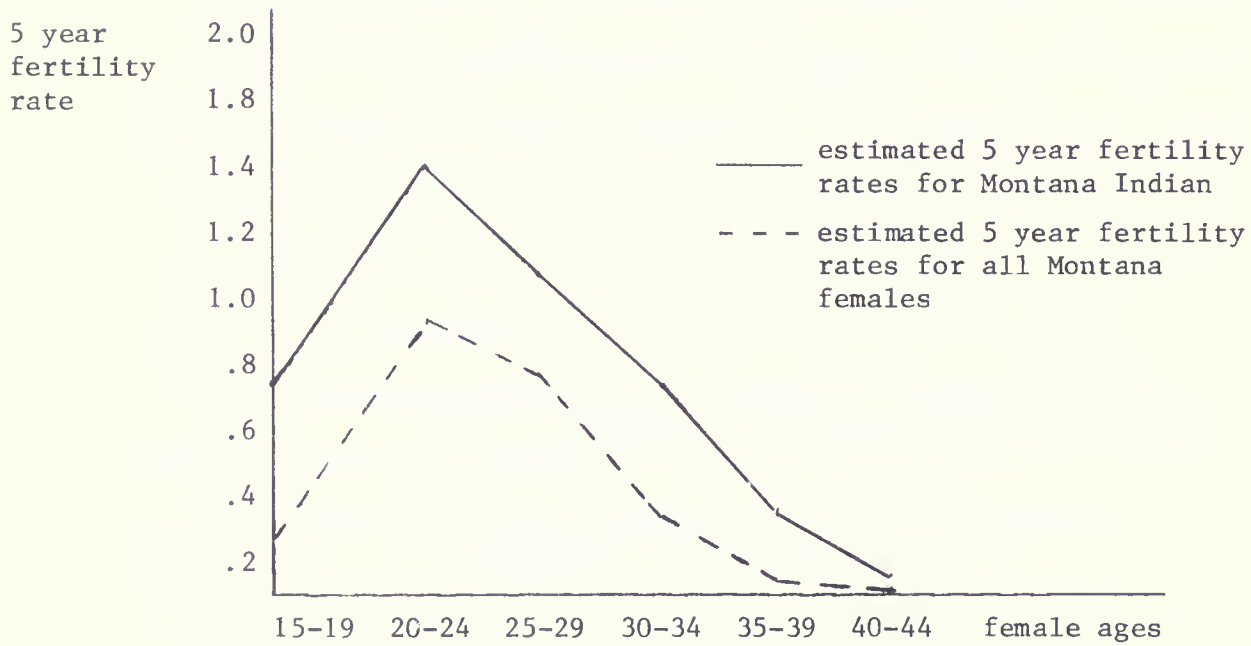


Table I.2

1970 Montana Indian and Montana Total

Five Year Fertility Rate Estimates

Ages	15-19	20-24	25-29	30-34	35-39	40-44
Montana Indian	.7550	1.4000	1.0885	.7930	.3518	.1118
Montana Total	.2915	.9635	.7435	.3455	.1520	.0440

As explained in later chapters and appendices, technical considerations resulted in the necessity of producing and using fertility rate estimates for Montana Indians as a whole rather than for Northern Cheyennes, specifically. No data base has been found which is sufficient to the task of breaking Northern Cheyenne fertility rates out separately.

Note that the fertility rates presented here are analytical results rather than data elements per se. The data upon which these estimates are based are counts of actual numbers of births.

As with birth information, several sources of information about deaths of Indians were identified. The same type of summary report will be presented here as for birth information presented above; i.e., estimates of survival rates produced from data from these various sources is presented. Survival rates are the probability that an individual in a given age and sex group who is alive at the beginning of a period will still be alive at the end of the period. Technically, survival rates are defined as one minus the death rates, where the death

rate is the number of people in a given age and sex group who die during a given period divided by the average number of people in that age and sex group during the period.

Figure I.4 and Table I.3 present estimates of 1970 Montana Indian and Montana total five survival rates for the five year age groups 0-4, 5-9, ..., 70-74 and for the 75+ age group. Also, infant survival rates, which are subsequently incorporated into the 0-4 age group, are shown. These are the interest in that they reflect pre-natal care problems and the health problems of the new born.

c. Education

Current educational enrollment figures are collected by the Tribe's Career Development Program. Primary and secondary enrollments in Autumn, 1976, are summarized in Table I.4.

Table I.4

Autumn 1976 Primary and Secondary Indian School Enrollment

School	Lame Deer	Busby Grade	Labre Grade	Busby High	Labre High	Big Bend	Col-strip	Total
Northern Cheyenne	341	166	195	61	105	7	21	896
Other Indian	5	24	45	17	54	0	24	169
Total	346	190	240	78	159	7	45	1065

Figure I.4

Estimated Survival Rates

Montana Indian and Montana Total -- Males

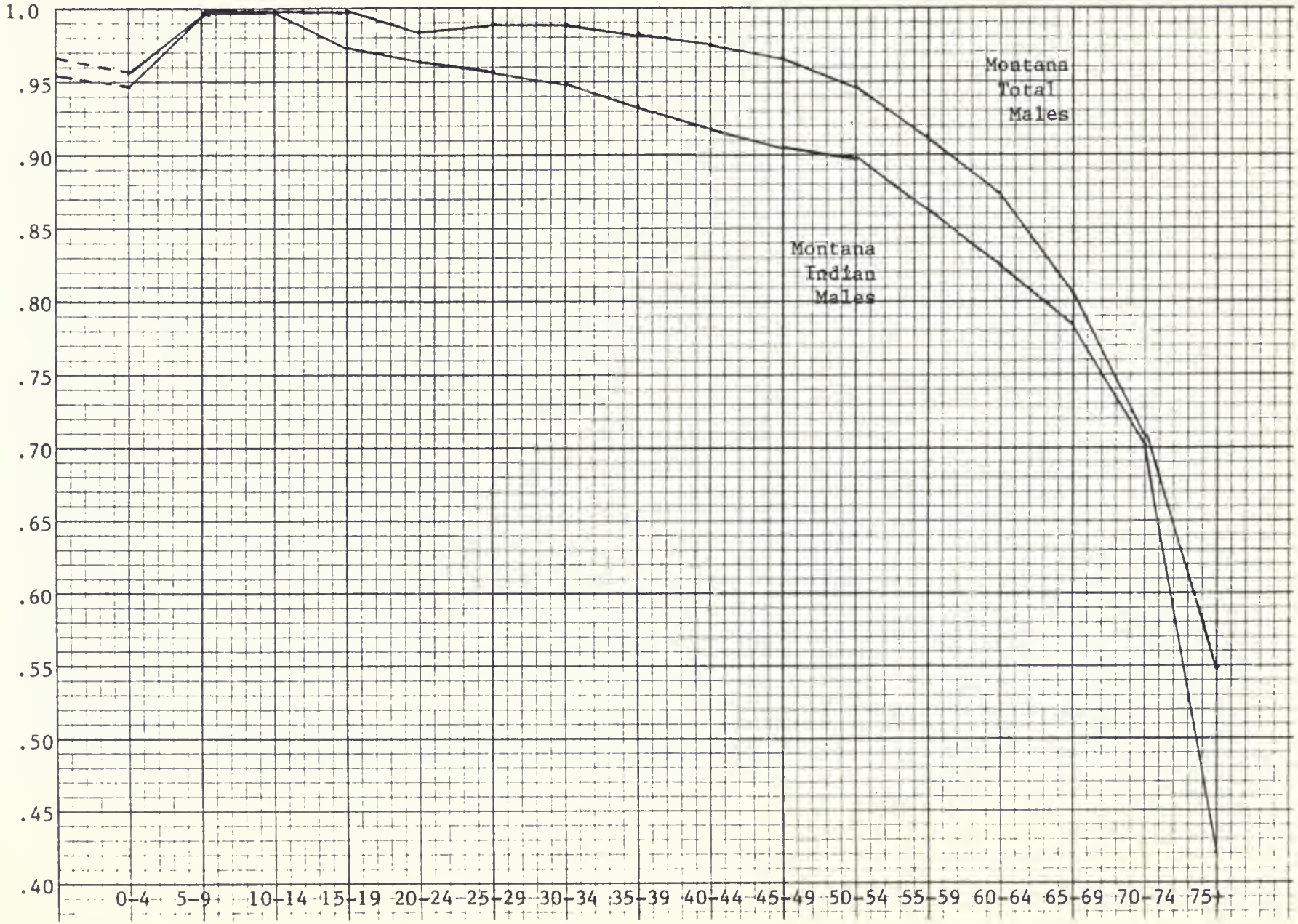


Figure I.4 (continued)

Estimated Survival Rates

Montana Indian and Montana Total -- Females

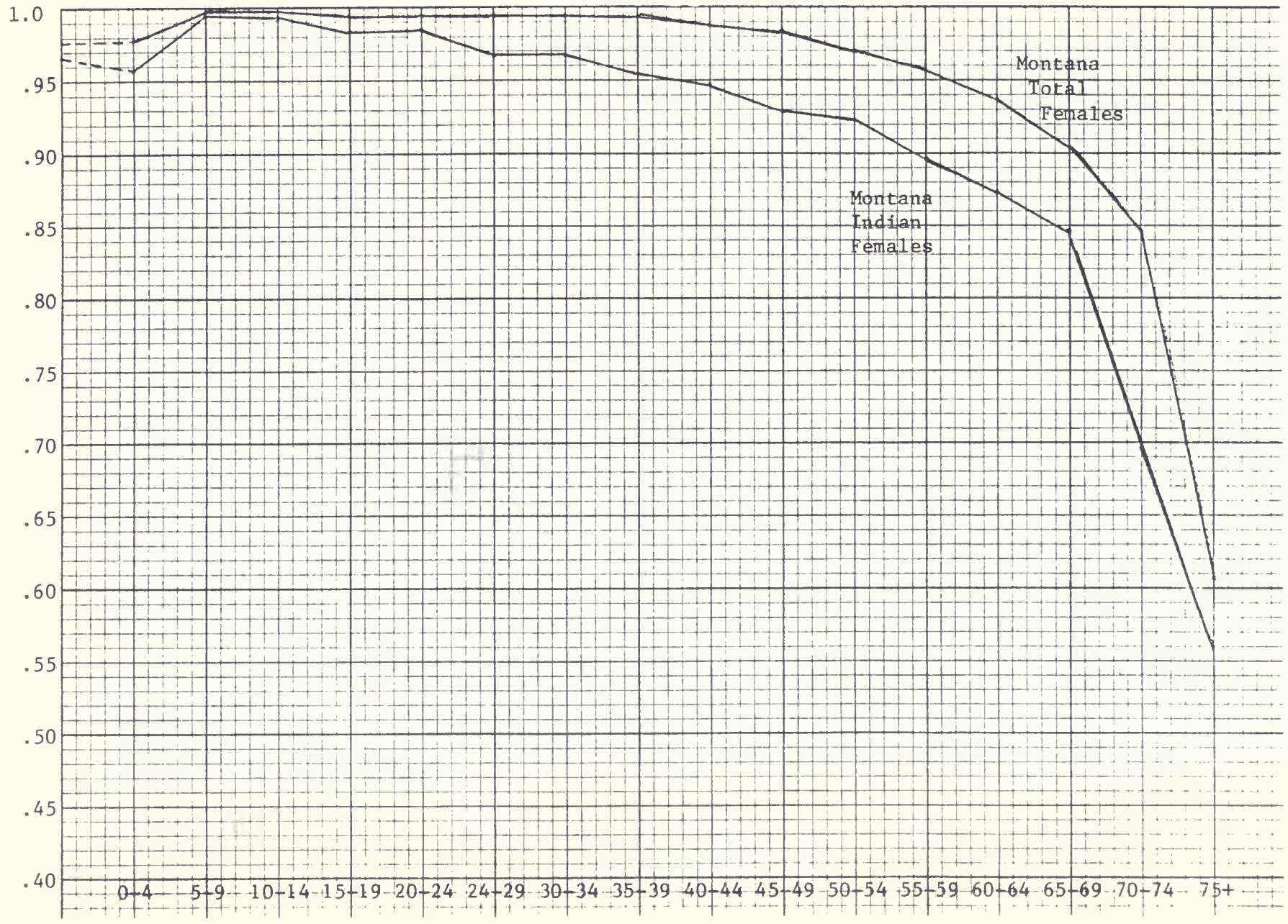


Table I.3

1970 Estimates of Montana Indian and Montana Total

Five Year Survival Rates

Montana Indian*			Montana**		
	Male	Female	Male	Female	
Infant	.9579	.9647	.9664	.9754	Infant
0-4	.9465	.9585	.9690	.9765	0-4
5-9	.9985	.9950	.9970	.9975	5-9
10-14	.9960	.9960	.9970	.9985	10-14
15-19	.9720	.9825	.9900	.9955	15-19
20-24	.9643	.9845	.9830	.9965	20-24
25-29	.9567	.9685	.9880	.9940	25-29
30-34	.9490	.9670	.9870	.9940	30-34
34-39	.9325	.9535	.9825	.9905	35-39
40-44	.9190	.9440	.9735	.9880	40-44
45-49	.9055	.9290	.9670	.9815	45-49
50-54	.8995	.9225	.9440	.9700	50-54
55-59	.8615	.8967	.9145	.9580	55-59
60-64	.8230	.8709	.8715	.9395	60-64
65-69	.7845	.8450	.8090	.9040	65-69
70-74	.7015	.6960	.7080	.8465	70-74
75+	.5500	.5600	.4205	.6070	75+

The Career Development Program also indicates that a total of 142 Northern Cheyennes are enrolled at various colleges and universities.

d. Economic Data

In the area of current economic data, secondary sources proved to be lacking in terms of Indian or Northern Cheyenne specific information. The Bureau of Census provides 1970 estimates of employment and income but these are both out of date and subject to reservations deriving from the tendency to undercount Indians discussed above. The U. S. Bureau of Economic Analysis provides good annual estimates of total employment and earnings by industry for counties, but they do not provide Indian breakouts. Similarly, the Montana State Department of Employment Security has provided detailed industry sector employment for counties relevant to Reservation analysis, but these also do not provide racial detail. Thus, what is known about Northern Cheyenne employment and incomes has been developed from primary research--the household, business, and governmental agency surveys. Since these are reported in another volume, they will not be summarized here.

This completes discussion in this chapter of investigations by Rho into secondary data sources. In general, as was expected, many sources were located. Some of these proved very helpful, others not. Some particular data needs were found not to be available in the form, detail, and timeliness required for the Northern Cheyenne decisions

information system designed as part of this project. These needs must be met by primary research such as the surveys conducted over the last year by NCRP.

Two comments can serve to conclude this section: First, the Tribal Comptroller's Office, currently being developed, should prove to be a very valuable secondary data source for future research and analysis. Second, the investigations of secondary data sources have been made possible by the assistance and cooperation of personnel in each of the agencies dealt with. In subsequent chapters, proper identification and credit is given to each of these people. In future implementation, development, and use of the information system, the ability to call on the assistance and cooperation of these individuals at the sources of secondary data will prove invaluable.

2. Participation in Specifications of Potential Economic Development Projects for Preliminary Feasibility and Impact Analysis.

Before its participation in this project formally began, Rho personnel participated in extensive discussions concerning the selection of potential economic developments to be subjected to economic feasibility and impact analysis. These early discussions lead to the refinement of a previously proposed set of four development policy alternatives to serve as framework for further discussions leading to the selection of a small number (eventually three were selected) of specific development projects to be subjected to analysis. Five policy developments

were finally established. These were:

Alternative 1: Non-Coal On-Reservation Development

Alternative 2: Smaller Scale On-Reservation Coal Development

Alternative 3: Larger Scale Coal Developments on or Near the Reservation

Alternative 4: Participate in Off-Reservation Developments (Coal or Non-Coal)

Alternative 5: Non-Development

These five alternatives were, of course, general in nature. Their purpose was to establish several directions the Northern Cheyenne Tribe might wish to follow in selecting development projects to improve the economic well-being of the Tribe and its people. In order to carry out the required analysis, it was necessary to narrow down this list of general alternatives to specific projects such as specific sizes and locations of coal mines, specific types of non-coal related developments, etc. In order to assist in this narrowing down and selection process, Rho prepared a discussion paper titled, "Preliminary List of Potential Economic Development Projects." This paper listed a total of 17 potential developments which could be considered for implementation by the Tribe. From this list, NCRP personnel eventually selected three for first cut preliminary analysis in this project. These three are: (1) small scale development of the Midway Coal Mine, primarily for use on the Reservation with as much of the produced coal as possible being

distributed to Northern Cheyenne users at the lowest possible cost; (2) a large scale coal mine located near the Reservation, but not on it, for export of coal to Midwestern and/or Pacific Coast markets; (3) off-Reservation grazing of cattle on U. S. Bureau of Land Management or Forest Service land such as Custer National Forest. Initial analysis of these developments are summarized in the next two subsections of this chapter and detailed in following chapters and appendices.

This subsection can be concluded with a summary of several points about the selection of projects for analysis made in the above cited discussion paper:

1. Selection of a potential development for analysis does not indicate a desire or commitment for actually carrying out the development. It may represent either a desire to undertake the project, or a desire to prevent the development from occurring, or, more likely, a desire to know more about the feasibility and impact of the project before forming a sound judgement as to its desirability.

2. The developments included in the paper were suggestive only; additions, deletions, modifications were encouraged.

3. Only 2 or 3 specific developments could be considered in the project covered by this report.

4. Water related developments were specifically excluded because the Tribe is currently involved in a court suit regarding its water rights and because of limited information on the Reservation hydrosystem itself.

3. Preliminary Feasibility Analysis

This section summarizes analysis of the feasibility of the three potential economic developments specified for analysis:

(1) off-Reservation grazing on Federal land, (2) small scale on-Reservation coal mine for on-Reservation use, and (3) large scale near-Reservation coal mine for export.

a. Off-Reservation Grazing on Federal Land

At the preliminary analysis stage of the analysis process described in Section II.A., above, serious questions about the possibility of the Tribe's undertaking such a project were encountered. These difficulties are primarily legal in nature. They derive from the Taylor Grazing Act of 1934, which controls use by private groups and individuals for profit of land owned by the Federal Government. Section 3 and 15 of the Act deal specifically with grazing. Section 3 covers most land which is suitable for grazing and virtually all of the best federally owned grazing land. Under the terms of Section 3, a "reasonable" annual payment per AUM is required in return for a license to graze a given number of animals on specified tracts of federal land. All licenses were issued shortly after passage of the Act in 1934. No new licenses will be issued unless license holders upgrade the AUM bearing capacity of the land at their own expense. Licenses are inseparably legally tied to pieces of private (base) property which must be in the possession of the licensee. It is legally impossible to secure a license held by another party except by purchase of the base property and applying for the license which

attached to it, or by securing the transfer of the license from one property to another. This latter approach is, apparently, discouraged by BLM's instruction memo number 76-250, Methods of Estimating Benefits and Costs of Public Range Investment. This document says that grazing privileges are inseparable from particular private ranching properties.

Section 15 of the Taylor Grazing Act covers the smaller and less desirable grazing tracts. Section 15 also requires payment of a "reasonable" annual payment per AUM. Under Section 15, grazing privileges are issued and reissued according to the qualifications of the applicants in terms of contiguousness to federal land, ability to fully utilize land (such as sufficiency of private holdings for winter feeding), historical use, "suitability of operation," etc. Section 15 grazing privileges are issued for periods of from one to ten years. As they expire they are either renewed or transferred to other applicants according to qualifications as discussed above.

From this preliminary investigation, it appears unlikely that the Northern Cheyenne Tribe will be able to secure grazing rights on federal land under either Section 3 or Section 15 unless it attempts to purchase private lands to which such privileges are currently attached. Since this appears to be such a costly undertaking and since the resources of the Tribe for such an effort are limited, research on this issue was ended at this point with the preliminary

conclusion that this alternative is unfeasible. If the Tribe wishes to have the matter analysed further, it should, of course, return the issue to the NCRP according to the "Return for Further Analysis" arrow in Figure I.1.

b. Small On-Reservation Coal Mine for On-Reservation Use

As part of this project, a provisional feasibility analysis for a small coal mine at the Midway site was conducted. Since no mining plan based upon engineering and survey reports has been made, the approach taken in the analysis was to make a reasonable estimate of the required capital and operating costs that might be expected in opening and operating the mine. These costs were estimated at $403,900 for structures and equipment and $181,700 per year for labor, supplies and indirect expenses. Then demand and revenue projections were made on the assumption that the coal produced would be used to serve the on-Reservation market as well as Northern Cheyenne families living near the Reservation. These projections of the demand for coal were based on the constant vital rate population projections. At a delivered price of $15 per ton, annual revenues were projected to increase from $46,000 in the first year of operation to $86,000 in the tenth year. On the basis of these costs and revenue estimates, the mine was found to be infeasible in that the revenues generated would not cover the costs of developing and operating the mine. This was also found to be true at delivered selling prices of $20 and $25 per ton.

The next step in the analysis was to find the break even or minimum feasible volume of production necessary to cover the assumed costs. It was found that this would entail considerable export of coal from the Reservation. Various production and export estimates were made for different assumed selling prices and financing alternatives. At $15 per ton and borrowing the initial capital at an 8 percent interest rate, annual average production and exports were estimated at 16,333 and 12,000 tons, respectively. In general higher prices and financing through subsidies in the form of grants lead to substantial reductions in the production and export levels needed to cover the assumed costs.

The last step in the analysis was to establish the maximum feasible capital and operating costs that could be incurred and meet Reservation and Northern Cheyenne demand for coal at various prices. These cost parameters were found to be considerably smaller than the original estimated costs. Assuming a 2 to 1 capital to operating cost ratio, a selling price of $15 per ton and borrowing the initial capital at 8 percent, it was found that capital costs of $96,000 and operating costs of $48,000 annually could not be exceeded and still have the mine break even. However selling prices, of course, result in smaller feasible cost levels while subsidies lead to higher feasible costs. The implications of several of these alternatives were considered in the analysis. Whether or not producing the

tonnages required to meet projected demand at reasonable prices is possible is a matter for further investigation. There is a real need for an engineering analysis for the purpose of developing a mine design which could (if possible) meet maximum feasible cost parameters. Also, various ways of reducing mining costs need to be explored. These include shifting costs by receiving grants and sharing costs and equipment with other programs and projects to the extent possible.

c. Large Coal Mine for Export of Coal

A preliminary feasibility analysis was conducted for developing and operating a large scale coal strip mine near the Reservation for the production and export of coal. Again no mining plan for a particular site was available. However, information concerning mining costs in the Northern Great Plains and physical characteristics of the Tongue River Valley was used in the analysis.

The mine was assumed to have an annual production rate of 4.6 million tons and to have a 20 year life. Initial capital costs were estimated at $23,000,000, deferred capital investment at $17,000,000, and annual operating costs at $11,000,000. Costs include costs of restoring surface contours and mulching, liming, fertilizing and reseeding the stripped area. Rates of return over costs on the

initial invested capital were computed at various mine mouth prices both before and after severance taxation. These rates of return were computed as total returns to capital before business taxes and interest and lease costs. With specific assumptions about ownership and lease arrangements as well as the applicability of various taxes, net returns could be readily computed since the analytical routine is programmed on a small programmable calculator.

At $5, $10, and $15 per ton mine mouth contract prices but before severance taxation, the computed rates of return were 51%, 153%, and 254%, respectively. These yielded average annual raturns of 12, 35, and 58 millions of dollars, respectively. With severance taxation of 30 percent of contract price for 8,000-9,000 BTU/lb. coal, these rates of return fell to 19%, 92%, and 163% for the three mine mouth prices. Average annual returns were computed as 4.5, 21, and 37 millions of dollars respectively.

The general conclusion of the analysis is that development and operation of a mine of this size would most likely be a highly profitable undertaking. Also, with 111 production, maintenance and management employees, it would offer considerable employment opportunities for Northern Cheyenne Tribal members if sufficient training were available.

4. Preliminary Impact Analysis

As indicated and emphasized several times in this chapter, feasibility analysis, such as those summarized in the previous subsection

do not provide all the information required to decide upon the desirability or undesirability of any potential economic development or to plan to deal with the effects of such a development on the lives of the people affected by it. Feasibility analysis simply tells whether the development will be able to succeed as a profit making business venture. Impact analysis is much broader in that it attempts to tell the Tribe what the overall economic, social-cultural, and physical environmental effects of the development are likely to be in terms which will: (1) allow the Tribe to judge whether or not the development is desirable, i.e., whether or not the overall benefits of the project outweigh its overall costs as viewed from the standpoint of Tribal values, traditions, goals, etc.; and (2) provide needed information to support Tribal planning for dealing with the impacts of developments which are undertaken. As indicated in discussion of Figure I.2. early in this chapter, impact analysis is broken down into three equally important categories: (1) economic impacts, (2) social-cultural impacts, (3) physical environmental impacts. The economic category is discussed here. The other two are the responsibility of NCRP staff researchers.

Two introductory comments are required before discussion of the analyses carried out: (1) for analytical purposes, economic impact analysis is further broken down into a population component and a more strictly economic component. The population component deals

with changes in the number of people in an area and in their age, sex, and racial breakdowns. The economic component deals with such strictly economic characteristics of an area as changes in employment, wages and salaries earned, incomes to individuals and households, etc. These two components are, of course, interrelated in that significant changes in either one will probably produce changes in the other. The analytical methods used in this work recognize this interdependence, but concentrate on each separately.

(2) The purpose of impact analysis is to determine the future effects of a potential economic development on the lives of people on and near the Reservation. Since the future is what is being considered, an understanding of what the future might be like without the development is necessary to put the projection of future conditions with the development into context. Thus, two types of projections of future conditions are required: (1) a baseline projection, assuming no major new developments, which provides the context within which the impacts of potential economic developments are to be evaluated; and (2) the projections of the impacts of the potential economic developments themselves.

As intended at the beginning of the project, the complete population-economic, baseline-impact projections for the developments considered in this project were not completed during this project. The baseline population projections for the Indian population have been completed along with several additional projections

which reflect possible future variations in Indian fertility and survival rates. These are summarized in the following subsection. Analysis of economic impacts was limited to a simple projection of the total increase in numbers of people and employment expected in Rosebud County as a result of the large scale near Reservation coal mine. This analysis is very crude and preliminary in nature, but does provide a "ball park" estimate.

i. Population Projections

The work done in the area of population projections concentrates on the Indian population of the Reservation. Since the non-Indian population fluctuates mostly with opportunities for jobs, and since little is known about how many more jobs for non-Indians may become available on the Reservation over the next several years, the non-Indian population is simply assumed to remain constant. If, as appears to be happening over the last few years, it happens for a time that jobs available to non-Indians increase and therefore the number of non-Indians increase, then this should be reflected by simply raising the number of non-Indians on the Reservation. It does not appear that this increase will continue into the future in any continuous or systematic manner. Thus, it would be inappropriate to apply the kind of population projection calculation routine used to project Indian population as described below.

The method used to produce the population projections presented in this report is a version of the so-called "three component cohort" method. An extended discussion of the method is presented in a later chapter and a completely detailed technical presentation is presented in Appendix B.2. Only a brief description of the general nature of the method is presented here so that the reader who is not interested in the details can understand in general terms what has been done.

In general, the three component method is based on the obvious fact that there are just three ways in which an area's population can change from one point to the next. These ways are the three components: (1) Births, (2) Deaths, and (3) Migration. Thus, in the three component method, population is projected by projecting first the increase due to births, second the decrease due to deaths, and third the increase due to in-migration or decrease due to out-migration. The total change in population, then, is produced by adding births, subtracting deaths, and either adding in-migration or subtracting out-migration. Finally, the total population is produced by adding or subtracting the total change to the population of the base period, i.e., to the "initial population."

It is well recognized that the three component method functions best if the population is broken down into sub-groups rather than being treated as a total. The technical term for the sub-groups used in this type of analysis is "cohorts." Thirty-two cohorts are used in the Indian population projection method used in this report. These cohorts consist of sixteen 5-year age groups starting with the group who are

0 to 4 years old at the base period (1975) and continuing throug 5 to 9 years old, 10 to 14 years old, etc., through 70 to 74 years old, and finally the oldest group is the total 75 years old and older population. A separate set of sixteen cohorts is used for each sex, thus there are 16 x 2 or 32 cohorts. In summary then, the method used is the three component cohort method which means that population change is projected in the three components: (1) births, (2) deaths, and (3) migration for each cohort or population sub-group of which 32 have been used for the population projections developed here.

It is important to note here that this method has been developed to the point where it can be utilized by the NCRP as part of the decision information system. The actual population projections produced by Rho and presented in this chapter are interesting, but as time goes on, the Tribe will undoubtedly discover that the assumptions about birth rates, death rates, and migration were, in some aspects unrealistic and that different assumptions would be more realistic. As this occurs, if this method is implemented at NCRP, new projections reflecting the new assumptions can be produced in a short time. This point will be emphasized later in this subsection.

In this summary chapter, only a very brief summary of the four projections produced is presented. Remember that more detailed presentations of the projections and the assumptions on which they are based appear in Chapter II and Appendix A.2. These details consist of the following: five year age groups, the male and female sex groups,

Northern Cheyenne vs. Other Indian, and whether living on the Reservation or the Ashland off-Reservation area as defined by the 1976 Tribal Census.

In all four projections, the part of the migration component of population change which occurs in response to economic opportunity, i.e., moving into or out of the area to take or look for a job, is assumed to be zero. This may not be realistic, especially among young adults, but no data could be found upon which to base reasonable projections of such migration. One particularly important use to which the method may be put in the future is to derive the population implications of either continued out migration of this sort or a reversal of that trend in response to economic developments on or near the Reservation which may produce job opportunities for Northern Cheyennes.

The part of the migration component which is not directly related to job seeking, e.g., moving to attend college, to enter the military, etc., is included in the projections and varies with other conditions as seems reasonable.

Differences in the four projections result from differences in the fertility and survival rates assumed in each projection. The first projection produced is titled the "Constant Vital Rates" projection. Here, the 1976 fertility and survival rate estimates presented in Chapter II are used and are assumed to remain constant through 1990, which is the end of the projection period. The second projection titled

"Increasing Survival," assumes that fertility rates remain constant but that Indian survival rates rise from the 1976 estimates used in the first projection to the level estimated for the total Montana population. This rise is assumed to be gradual so that the Montana total rates are reached at the end of the projection period. The third projection assumes the same constant survival rates as the first, but assumes that the apparent current trend toward lower fertility rates among Indian women continues to 1990. This projection probably represents a lower limit to such a decline since it assumes that by 1990 fertility rates will have declined to a zero population growth (ZPG) level. These rates would produce just enough births in each generation to replace deaths and a constant population would result. At present and for the last several years, the total U. S. population has been below the ZPG level, but it is unlikely that Indian fertility rates would decline below that level by 1990. The final projection combines increasing survival rate assumptions of the second with the decreasing fertility rate assumptions of the third to produce the "Increasing Survival, Decreasing Fertility" projection.

The resultant projections are summarized in Table I.5.

Note the importance of these varying assumptions. The difference between the highest and lowest projections by 1990 is 701 or 21 percent. This difference has significant implications for Tribal program planning as well as for the urgency of economic development policy and planning.

Table I.5.

PROJECTED INDIAN POPULATION ON THE NORTHERN CHEYENNE RESERVATION--SUMMARY

Projection	1975*	1980	1985	1990
Constant Vital Rates				
Population	2,616	2,986	3,415	3,917
Northern Cheyenne	2,293	2,616	3,000	3,456
Other Indian	323	370	415	461
Increasing Survival				
Population	2,616	3,011	3,496	4,081
Northern Cheyenne	2,293	2,637	3,067	3,597
Other Indian	323	374	429	484
Decreasing Fertility				
Population	2,616	2,897	3,155	3,380
Northern Cheyenne	2,293	2,538	2,769	2,976
Other Indian	323	359	386	404
Increasing Survival Decreasing Fertility				
Population	2,616	2,921	3,205	3,478
Northern Cheyenne	2,293	2,557	2,820	3,069
Other Indian	323	364	385	409

Another interesting implication of these projections can be derived from the detailed population tables prepared for the Tribe and the NCRP. From these details, it can be shown that school age population will vary between 38% and 35% of the total on-Reservation Indian population while the 65 years old and older population will vary between 3.4% and 4.9%. Such differences as these have significant implications along with differences in total populations as shown in the above table for program planning and for priorities among programs.

To conclude this discussion, it can be re-emphasized that the method used to produce these projections is available for implementation as a permanent part of the NCRP decision information system and that if this implementation takes place, the NCRP will be able to generate new population projections as part of the overall impact analysis process by changing assumptions and inputs into the analysis.

ii. Preliminary Analysis of the Economic and Demographic Impacts of a Large Coal Mine Near the Reservation--Summary

In order to provide a first approximation projection of the economic and population impacts of a large coal mine of the sort discussed in Subsection c., above, a simple variant of the economic base methodology was used. The method is rather crude and the calibration techniques used leave much to be questioned in terms of the magnitude of the numbers produced. Nevertheless, it can reasonably be asserted that the analysis

provides a good first approximation to the magnitudes of the impacts on the area of such a mine. Since the mine being considered is assumed to be located in the Tongue River Basin near the Reservation, the analysis was carried out for Rosebud County as a whole.

Both the methodology and the implications of the analysis are discussed in Chapter II with extensive detail presented in Appendix A.5. Only a broad summary of the projected impacts themselves are presented here. By 1990, the analysis indicates that, if the mine is constructed and is in operation according to the schedule assumed in the feasibility analysis, there will be 111 basic jobs in the mine. These basic jobs will generate sufficient additional income in the area to produce a total of 177 additional jobs to produce goods and services to serve the local population. Thus, 288 additional jobs will exist in 1990 in Rosebud County if the mine is built. This represents additional total earnings (in 1976 dollars) of $2,779,000. The total population associated with the development, i.e., the families of those working at the mine and the families of those whose jobs result indirectly from mine operations, is projected to be 777 by 1990.

The methodology and data used have not permitted an attempt to allocate these impact projections between Northern Cheyenne and other groups. Neither has it been possible to attempt to determine an allocation between the population already living in the area and in migrants. The purpose of the detailed impact projection methodology

as set out in Chapter III and Appendix B.2. is to provide these more detailed projections.

D. ORGANIZATION OF REPORT

As indicated earlier this chapter has presented the first, most general and least detailed, layer of discussion to be presented in this report. The following three chapters present the intermediate layers. Much more extensive discussions are developed in these chapters, but as little technical jargon and mathematical expression as possible have been used.

Chapter II "Preliminary Analysis," discusses the methodologies used to carry out the "first cut" feasibility and impact analysis carried out in this project. Also, the population projection methodology, which has been brought to final form development, is presented and the four alternative projections, based on current estimates of Northern Cheyenne birth and death rates and possible future variations in these rates are presented.

Chapter III "Purpose and Nature of the Proposed Northern Cheyenne Decision Information System," addresses what is felt to be the heart of the effort in this project. Here, the purpose of a decision information system and its potential roles in Tribal decision making are further discussed and the outlines of a specific system which, it

is felt, would serve the needs of the Northern Cheyenne Tribe are set out. Finally, presentations are made of the details of feasibility analysis and impact projection methodologies designed for implementation at NCRP. As is the case with the population projection methodology, the feasibility analysis technique is developed to its final form. Reservations about the implications of the first cut feasibility analyses appearing in this report are based upon data used, not upon the methodology itself.

The economic impact projection methodology is in a more preliminary state of development. The structure of the method would probably require little modification during an implementation phase. Some of the details are, as yet, quite sketchy and would have to be completed or revised during implementation.

For emphasis, it can be repeated here that the importance of these analytical methodologies, as of the decision information system as a whole, is that <u>if they are implemented</u> by the Tribe, they will give the Tribe the ability to generate required information and analysis as required to support Tribal planning and decision making at all levels.

Chapter IV "Data Development and Information Sources," is, in effect, a chapter presenting both information <u>per se</u> and information about information--its sources and nature. An important part of any

decision information system is an understanding of what information is available, what the characteristics of information from various sources are, and the reliability of information from each source. A major part of the Rho effort in this project has been to locate sources of information and evaluate them in terms relevant to the proposed decision information system. Thus, while much useful data about the Reservation and its surroundings appear in Chapter IV, much additional information about types, locations, reliability, etc., of various data sources are also presented. This chapter is, frankly, quite dry and should, for most readers, be read selectively to meet specific information needs.

The appendices are organized along the same lines as Chapter II, III, and IV. Thus Appendix A presents a technical discussion of the analytical issues discussed in Chapter II, Appendix B further develops the material on the proposed decision information system presented in Chapter III, and Appendix C presents the details of the information summarized in Chapter IV. Throughout the remainder of the report, sections, subsections, etc., for which additional material is presented is an appendix are indicated with an asterisk (*) by the section, subsection, etc., letter or number.

CHAPTER II

PRELIMINARY ANALYSIS

As indicated in Chapter I, the present chapter begins the second or intermediate level of detail "layer" in the presentation of the work done by Rho in this project. Complete analytical details do not appear in this chapter, but are reserved for Appendix A. References to specific items in the appendix are provided in the text to assist those wishing to investigate, in detail, specific aspects of the material presented here. This chapter attempts to introduce the analytical questions addressed in the project, outline in terms as non-technical as possible the methods and procedures developed and adopted to deal with these questions, and summarize the results and conclusions of the work. The chapter is organized into two main sections. Section A. deals with efforts of the Northern Cheyenne Tribe, the NCRP, and Rho to identify for analysis specific development projects to be subjected to feasibility and impact analysis. Section B. discusses the actual analyses carried out during the project. This discussion is further broken down into subsections on population projections, a preliminary feasibility analysis of off-Reservation grazing on Federal Land, a preliminary

feasibility analysis of the Midway Mine, a prelininary feasibility analysis of the feasibility of a large (4.6 million tons per year) coal strip mine located near the Reservation, and a preliminary analysis of the economic and demographic impacts which could be expected to result from such a large mine if it were actually developed.

Two points regarding the analytical work presented here must be reemphasized: (1) The analysis done here is, by design, preliminary or "first cut" in nature. It was recognized at the beginning of the project that neither time nor resources available would permit adoption of thoroughgoing analytical procedures such as those designed for future implementation at NCRP and reported on in Chapter III., below. Thus, while the results of these efforts do give reasonable first approximation answers to the questions they address, limitations in data and/or analytical technique make it necessary that more work be done before the work reported here could be taken as the best possible analysis. The population projections discussed in Section B.1. are an exception to the above. (2) In addition to providing first approximation answers to important questions, the analyses presented here are intended to serve as examples of the kinds of analyses which the Tribe would have the capacity to carry out if the decision information system as introduced in Chapter I and discussed extensively in Chapter III were actually implemented in the NCRP.

*A. DEVELOPMENT ALTERNATIVES

Before the project was formally begun, Rho personnel participated with Tribal and NCRP personnel in extensive discussions concerning the selection of potential economic developments to be subjected to economic feasibility and impact analysis. These early discussions lead to the refinement of a previously proposed set of four general development policy alternatives to serve as a framework for further discussions leading to the selection of a small number (eventually three were selected) of concrete development projects to be subjected to analysis. Five policy developments were finally established. The five were eventually abandoned, but they serve to organize this discussion of the process and logic through which the selection of the three projects for analysis was made. The five alternatives were:

Alternative 1: Non-Coal On-Reservation Development

Alternative 2: Smaller Scale On-Reservation Coal Development

Alternative 3: Larger Scale Coal Developments on or Near the Reservation

Alternative 4: Participate in Off-Reservation Developments (Coal or Non-Coal)

Alternative 5: Non-Development

In order to promote discussion, to describe the general nature of several potential developments, and to sketch the general outlines of considerations which should influence the selection, Rho

prepared, in October, 1976, a paper titled "Preliminary List of Potential Economic Development Projects: Discussion Paper." A copy of this paper is included in Appendix A.1. The main points of the paper can be summarized as follows:

1. Selection of a potential development for analysis does not indicate a desire or commitment for actually carrying out the development. It may represent either a desire to undertake the project, or a desire to prevent the development from occurring, or, more likely a desire to know more about the feasibility and impact of the project before forming a sound judgement as to its desirability.

2. The developments included in the paper were suggestive only; additions, deletions, and modifications were encouraged.

3. Only 2 or 3 specific developments could be considered in the project covered by this Report.

4. Water related developments were specifically excluded because the Tribe is currently involved in a court suit regarding its water rights and because of information limitations.

The following 17 developments were suggested for discussion (A short paragraph on each appears in the discussion paper):

Coal Based Developments

1. Very Small Scale Coal Mine to Supply Local Coal Needs on and Near the Reservation,

2. Small to Medium Scale Coal Mine for Sale of Coal to Midwestern or Pacific Coast Markets,

3. Large Scale Coal Mine for Sale of Coal to Midwestern or Pacific Coast Markets,

4. Large Scale Coal Mine with On-Reservation Power Plant,

5. In-Situ Coal Based Gas Extraction;

Development of Reservation Timber Resources

6. Tribally Owned and Operated Logging and Milling,

7. Tribally Owned and Operated Logging Operation Selling to Non-Tribal Mill,

8. Non-Tribal Lease of Logging Operation with Tribally Owned and Operated Mill,

9. Non-Tribal Lease of Logging Operation Selling to Non-Tribal Mill;

Further Development of Agricultural Activity

10. On-Reservation Range Improvement,

11. Off-Reservation Grazing on Federal Land,

12. On-Reservation Integrated Cattle Operations,

13. Cropping Irrigation;

Development of Other Underground Resources

14. Oil and Gas Development,

15. Uranium Mining,

16. Geothermal Heating,

17, Geothermal Electric Generation.

On December 3, 1976, Rho participated in a meeting at Lame Deer at which final selection of three developments for analysis was made. These three developments are:

1. Midway mine development for on-Reservation use and for export,

2. Development of a large (3-5 million tons per year) strip mine in the Tongue River Valley area for export (this study is for information purposes only),

3. Off-Reservation grazing on federal lands.

Subsequent sections of this chapter are organized partly in terms of analysis of the first two of these potential developments.

B. ANALYSIS

The feasibility and impact analyses carried out during this project were, by design, preliminary in nature and their implications should be viewed as provisional. The exception to this statement is the population projections summarized below and detailed in Appendices A.2. and B.2. These population projections are discussed in Subjection 1., below. Subsections 2., 3., and 4., then address the preliminary feasibility of off-Reservation grazing on federal land, a small scale local consumption on-Reservation coal mine such as the Midway mine, and a large coal strip mine near the Reservation, respectively. The preliminary analysis of the grazing development indicates little liklihood of success for such an endeavor so no impact analysis of that alternative was undertaken. Since the direct impacts of the small mine development are so limited, it was not thought necessary to undertake a separate impact analysis to project the indirect effects. Thus, for the small mine, the impact analysis is, in effect, included in the feasibility analysis. The direct impacts of the large scale mine are substantial, and thus a separate preliminary impact analysis was undertaken. The results of this analysis appear in the second part of Subsection 5.

Detailed discussions of these topics appear in appendices as follows: Appendix A.2. deals with population projections, A.3. with grazing on federal land, A.4. and A.5. with feasibility analyses of the small and large coal mines, respectively, and A.6. with the impact analysis of the large coal mine.

*1. Population Projections

Rho Corporation produced four population projections* for the Northern Cheyenne Research Project using the demographic technique described in Chapter III of this Report. The technique takes three factors into consideration: (1) fertility--the portion of population increase due to births over the period--(2) survival--the portion of population decrease due to deaths over the period--and (3) the non-employment related component of migration, including persons who are temporarily away for schooling and the military including young people temporarily present for boarding schools at Busby and Labre. Briefly, the technique, known formally as the "three component cohort survival technique," consists of estimating a base year population and projecting future populations by estimating births (the first component of population), deaths (the second component), and net migration (the third component), which are expected to occur over the period between the base year and subsequent projection years. All calculations are done on small sub-groups of the population

* See Table II.1 for aggregated results.

(the cohorts) so that proper account can be taken of differences in behavior among subgroups. In this work, the Reservation and surrounding area's Indian population was broken down into Northern Cheyenne vs. Other Indians and each of these groups was further broken down according to sex and the 15 five year age groups from 0-4 years of age to 70-74 years of age and a 16th age group consisting of those 75 years old and above. Due primarily to a lack of data and to limited resources, the non-Indian population was treated rather cursorily with the assumption that the non-Indian population on the Reservation will remain effectively constant.

In order to be consistent with most other work of this sort, 1975 was selected as the base year for the projections. This required the production of an estimate of the 1975 population, broken down as indicated above, based on the 1976 Tribal Census conducted by the NCRP and discussed in Volume I of this report. The procedure through which this estimate was produced, as discussed in Appendix A.2., consists of estimating births and deaths in the period from mid-1975 through mid-1976 and "restoring" the 1975 population from the 1976 Census count by adding back deaths and subtracting births.

This 1975 base year population was then used to estimate the births and deaths which are expected to occur between 1975 and 1980. Births are estimated by applying a "fertility rate" to each female population sub-group in the age groups 15-19 through 40-44--those which account for nearly all live births. The

fertility rate is simply the average number of live births expected to occur to women in each population sub-group over the five year projection interval. Thus, when multiplied by the number of women in each group, the fertility rate produces the projected number of live births. Extensive research was done, as is detailed in Appendix A.2., in estimating current Indian fertility rates in the geographic area of this project. These constitute the basis of the births component of the projections presented here. It is recognized that these rates may decline in the future, however, so a replacement, or zero population growth (z.p.g.) set of fertility rates for the Indians in the area of the Reservation was produced also and was used in two of the alternative projections. See below for a general statement of the resulting projections and Appendix A.2. for a discussion of the z.p.g. fertility rate estimation procedure.

Deaths over the 1975-80 period are projected in a manner similar to births. A "survival rate" is estimated for each cohort and multiplied by the initial population to project the number in each cohort which will survive to 1980. Survival rates are simply the probability that any person alive in 1975 will survive to 1980. These rates were also derived from extensive research as described in Appendix A.2., and can be viewed with considerable confidence. An upward trend in survival rates is seen as a real possibility over the next 15-20 years. Thus, a set of survival rates which coverage, by 1990, to those of the current Montana population as a whole were estimated and served as the bases for two of the alternative

projections. The procedures for producing these estimates are also detailed in Appendix A.2.

Work on the migration component of the population projections was limited to the non-employment related sub-component. The employment related part would be dealt with as part of the impact projection methodology as outlined in Chapter III and Appendix B.2. To the extent that the Reservation area is unable to provide economic opportunities for its younger population, this consideration will cause the projections presented here to overstate the population; especially so in the early adult and early childhood cohorts.

Finally, since the 1976 Tribal Census serves as the main data base of this work, the geographic area covered is that of the Census and includes the Reservation and part of Ashland. For detail on the 1976 Tribal Census, see Volume I of this report.

The following is a brief discussion of the assumptions made for each of the four projections: (1) Constant Vital Rates, (2) Increasing Survival, (3) Decreasing Fertility, and (4) Increasing Survival - Decreasing Fertility. A more detailed discussion of the vital rate estimates and estimating procedures and the projection methodology may be found in Appendix B.2.

(1) Constant Vital Rates--here it is assumed that both fertility rates and survival rates will remain constant to 1990 at estimated 1970 levels;

(2) Increasing Survival Rates--here it is assumed that Indian survival rates will increase to the level of the 1970 estimate

of total Montana survival rates by 1990--fertility rates are held constant as in (1), above;

(3) Decreasing Fertility Rates--here it is assumed that Indian fertility rates will decline to a zero population growth (ZPG) level by 1990; i.e., that these rates will be such that each generation will have just enough babies to replace itself and thus that the population will remain constant in the absence of migration--survival rates are held constant as in (1), above;

(4) Increasing Survival - Decreasing Fertility Rates--here the increasing survival rates of (2), above are combined with the decreasing fertility rates of (3), above

Migration can be divided into that which is induced by employment opportunity or lack of employment opportunity and non-employment related migration, e.g., a person going to college. In order to provide information about the effects of alternative assumptions about fertility and survival experience it has been assumed that no employment related migration occurs in this projection. Non-employment related migration is considered in the projections and is referred to as "Temporarily Absent Residents" (TAR) and "Temporarily Present Non-Residents" (TPNR). The TAR category includes Northern Cheyenne Indians who are away from the Reservation due to enrollment in college, vocational school, military and Cheyenne Home. It also includes the dependents of people attending college and vocational schools. The TPNR category includes Indians off the Northern Cheyenne Reservation who are temporarily living in one of the Census area boarding schools. Both estimated numbers of 1976 TPNRs and estimated 1976 TARs as a proportion of the

Table II.1

NORTHERN CHEYENNE RESERVATION INDIAN POPULATION*

Projection	1975**	1980	1985	1990
Constant Vital Rates				
Population	2,616	2,986	3,415	3,917
Northern Cheyenne	2,293	2,616	3,000	3,456
Other Indian	323	370	415	416
Increasing Survival				
Population	2,616	3,011	3,496	4,081
Northern Cheyenne	2,293	2,637	3,067	3,597
Other Indian	323	374	429	484
Decreasing Fertility				
Population	2,616	2,897	3,155	3,380
Northern Cheyenne	2,293	2,538	2,769	2,976
Other Indian	323	359	386	404
Increasing Survival Decreasing Fertility				
Population	2,616	2,921	3,205	3,478
Northern Cheyenne	2,293	2,557	2,820	3,069
Other Indian	328	364	385	409

* Age and sex breakdowns of the population have been provided to the Tribe and the Northern Cheyenne Research Project.

** Estimated from the Summer/Fall, 1976 Northern Cheyenne Tribal Census.

the total Northern Cheyenne population are assumed to remain constant throughout the projection period. Assumptions about TARs and TPNRs are the same in all four of the projections.

Constant Vital Rates

In the Constant Vital Rate projection it is assumed that fertility and survival rates will remain at the estimated 1970 level through 1990. This causes the population to grow at a relatively high annual rate of approximately 3.3% starting at 2,616 in 1975 and reaching 3,917 by 1990. Most of the growth occurs in the lower age groups. This is the result of women, by the time they reach age 45, having on the average approximately 4.5 children--more than enough to replace the number of deaths in the projection period.

Increasing Survival

In the Increasing Survival projection it is assumed that fertility rates will remain at their estimated 1970 level through 1990 and that survival rates will increase to a level equal to the estimted 1970 total Montana survival rates by 1990. By comparing this projection with the Constant Vital Rates (CVR) projection one can determine the possible effect of reduced mortality probabilities. By 1990 the total Indian population of the Northern Cheyenne Reservation is 3,917 in the CVR projection and 4,081 in the Increased Survival projection--a difference of 164 people or 4.5% of the Reservation population.

Decreasing Fertility

In the Decreasing Fertility projection it is assumed that survival rates will remain at their estimated 1970 level through 1990 and that fertility rates will decrease to rates that will produce zero population growth by 1990. In this projection women average fewer children--approximately 2.29 per woman reaching age 45--than in the Constant Vital Rates or the Increasing Survival rate futures--approximately 4.5 per woman reaching age 45. The result of reaching 2.29 children per mother is a stable population i.e., the number of births will equal the number of deaths or zero population growth given constant survival rates.

Increasing Survival - Decreasing Fertility

In the Increasing Survival and Decreasing Fertility projection it is assumed that survival rates will increase to a level equal to the estimated 1970 total Montana survival rates by 1990 and that fertility rates will decrease to a level that will produce zero population growth by 1990. This projection achieves the same ends as the Decreasing Fertility projection i.e., zero population growth by 1990. The difference is that survival rates are higher making the population, which will remain stable after 1990, 98 people larger. The general fertility rate or average births per mother reaching age 45 in this projection is 2.15 as compared to 4.5 in the Constant Vital Rate projection.

A summary of these population projections appear in Table II.1 and Appendix A.2. The complete details of the population projection methodology appear in the first part of Appendix B.2.

The non-Indian population of the Northern Cheyenne Reservation was 388 in 1976. Projections of future population size for the non-Indians were not made because most non-Indians on the Reservation are not permanent residents but rather are Tribal, school, BIA, or PHS employees. Consequently, the future population size of non-Indians on the Reservation cannot be predicted from birth and death rates. Rather the future non-Indian population size will depend on off-Reservation coal development and on Tribal policies regarding non-Indian residents. For example, if there is considerable coal development off the Reservation, many non-Indians will move into the area, and probably some will want to live on the Reservation. This happened during the construction of Colstrip Units One and Two. Colstrip is twenty miles north on the Reservation.* Such high levels of coal development are not likely to occur by 1985 because of the Northern Cheyenne Tribe's commitment to maintain its clean air. Furthermore, Tribal zoning and other policies may regulate the number of non-Indian residents in the future. Because very little Reservation land is owned by non-Indians, because so few non-Indians are permanent residents, and because the Tribe wants to maintain the integrity of its land base, it is assumed that the non-Indian population will stay about

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* One study of coal development in southeastern Montana predicted that at very high levels of development (including coal mine and coal gasification plants) the population of Lame Deer could reach 6,000 by 1985 (NGPRP 1974). This population increase would be mostly non-Indians.

the same or increase only slightly during the time period covered by Rho's population projections (1976-1990).

*2. Preliminary Feasibility Analysis--Off-Reservation Grazing on Federal Lands

Some early investigations into the institutional arrangements according to which grazing access to federal lands is secured indicated significant difficulties would be encountered in arranging such access for the Northern Cheyenne. A brief report on these early investigations is appended as Appendix A.3., which is summarized below. It was intended that Dr. Joseph C. Horvath would provide feasibility analysis for agricultural developments such as the off-Reservation grazing development. Unfortunately, the services of Dr. Horvath could not be maintained by NCRP. Due to the severe institutional obstacles the effort to secure grazing rights faces and the time and money expense that would be necessitated to replace Dr. Horvath's expertise, it was decided that further investigation and analysis of off-Reservation grazing feasibility and impacts must be curtailed in this project.

As indicated in Figure I.1, the analytical component of the proposed decision information system is intended to be responsive to questions arising from Tribal planners and decision makers. Work on this potential economic development was undertaken in this manner in response to a specific request from the Tribal Council. In Figure I.1, the first circle indicates that the first step in an analytical

response to such questions includes looking into the institutional and economic conditions under which the potential project would have to be carried out. The purpose of this preliminary investigation is to discover whether any institutional or economic conditions facing the proposed development appear as major obstacles to the project. If such obstacles are found, they should be reported to the Tribe with the recommendation that further feasibility analysis of the sort discussed in Subsection 3. and 4., below, not be undertaken unless some means is discovered to remove or overcome the discovered obstacles.

Such a major obstacle to the undertaking by the Tribe of off-Reservation grazing on federal lands was found to exist in the laws governing such grazing and the practices of the federal agencies which administer these laws--the Bureau of Land Management and the U. S. Forest Service. This investigation was carried out through telephone and letter interviews with agency personnel in Utah, Montana, and New Mexico.

The legal basis for private use of federally owned and administered lands for grazing for profit lies in the Taylor Grazing Act of June, 1934. Sections 3 and 15 are relevant to the proposed Northern Cheyenne effort. Section 3 deals with the better and better laid out grazing lands including established grazing districts. Grazing licenses for all Section 3 lands were issued shortly after passage of the act in 1934. These are tied by practice, and by policy as set out in BLM instruction memo 76-250, to particular specified ranching properties. Thus the

way for the Tribe to secure licenses to Section 3 lands would be to identify and purchase private lands to which such licenses are currently granted. Such a purchase would pose a major expense to the Tribe. Identification and evaluation of candidate private properties in terms of, first, availability for sale to the Tribe and, second, the economic feasibility of such a purchase to support off-Reservation grazing on federal land should probably not be undertaken unless the Tribe decides first that it wishes to incur the substantial costs which would be required to carry out such an investigation and then to seek financing for the purchase of such a property.

Section 15 of the Taylor Grazing Act generally applies to land outside grazing districts and to scattered holdings. Leases for use of such lands are granted for 1-10 year periods. At the end of each period, these leases come up for renewal and can be applied for by parties other than those holding the lease for the period being completed. In selecting among competing applicants, the governing agency considers the qualifications of applicants in terms of contiguousness of applicant's private holdings as source of winter feed, etc.; ability to use profitably; historical use; suitability of applicants' other similar operations, etc. Since current lease holders have usually demonstrated acceptability in these areas, there is a bias in favor of continuing existing lease holders' leases. Thus here also it is recommended that no further analytical work be attempted until and unless the Tribe decides to incur the costs necessary to

make application for one of the nearby Section 15 leases as they expire.

Still another alternative is to attempt through judicial and/or legislative channels to bring about a change in legal and procedural conditions which would be favorable to Northern Cheyenne use of currently federally owned and administered lands. The procedures through which such an effort would be undertaken are too ill defined at the present to permit even an initial investigation by any one except legal specialists.

Therefore, it appears that due to the obstacles discovered in this preliminary investigation, no further analytical work, either feasibility or impact, should be undertaken unless the Tribal decision makers decide that the costs and uncertainties involved in such further work are justified by the potential benefits to the Tribe and its members and by the likelihood of success in achieving these benefits.

3. Feasibility Analysis, Midway Mine

This feasibility analysis of the Midway Coal Mine was done in the absence of the required preliminary exploratory and engineering work.

Without a mining plan or set of plans detailing operating procedures and the structures, equipment, and manpower requirements for various levels of output at the mine site, accurate estimates of input costs are not possible. Consequently, this analysis should be viewed as provisional and should be used with due caution. It is however, illustrative of the approach and analytical procedures that can readily be used for conducting feasibility studies as well as indicative of the types and magnitudes of costs necessary for opening and operating small strip mines.

In the absence of the required preliminary information, the approach taken was to first make a reasonable estimate of the required equipment and operating costs that might be expected in opening and operating the mine. Then demand and revenue projections were made on the assumption that the coal produced would be used to serve the on-Reservation market as well as Northern Cheyenne families living near the Reservation. Four revenue projections were made assuming different delivered selling prices. In no case was the revenue sufficient to cover operating costs let alone capital and interest costs. The next step taken was to find the revenue required to break even and the associated tons of output at different selling prices under three different assumptions of financing arrangements and capital recovery.

Generating of this revenue would, of course, require export of coal from the Reservation. Lastly, assuming a given selling price and a given ratio of capital to operating costs, estimates were made of the break even capital and operating costs that would allow feasible operation of the mine for meeting Reservation demand.

For purposes of this analysis an undertaking is considered to be feasible if the revenue generated by that activity is sufficient to cover all its costs. What is or is not a cost, however, is subject to varying assumptions. Too, it is possible to share some costs with other activities or to shift them to other parties. The latter involves subsidies either in kind or money by the person or organizations incurring the shifted costs. Possibilities for sharing and shifting costs are discussed below.

a. Capital and Operating Cost Estimates

The total initial capital cost of the mine is estimated at $403,900, $208,500 for production and delivery equipment, $150,000 for structures and $45,400 working capital. Exploration, engineering and site preparation costs were assumed to be financed by other programs or grants. The usable life of the equipment was assumed to be 10 years at the end of which it would have little if any salvage value and would have to be replaced if mining operations were to continue. Mine life was assumed to be 10 years with operations beginning in mid-1977. Average seam

thickness was assumed to be 12 feet and average overburden depth, 40 feet. A 90 percent recovery rate was assumed. Average annual production was estimated at 4,332 tons with an average of .2 acres stripped per year. Delivery of coal was assumed to be by truck.

Employment was estimated at 5 full time and 4 half time workers. All workers are assumed to be skilled with production and delivery personnel receiving Bacon - Davis wages. Personnel costs including wages, salaries, fringe benefits, and payroll taxes was estimated at $128,000 per year, operating supplies at $30,000 and indirect cost at $23,700 for a total of $181,700 for annual operating costs exclusive of depreciation. Interest costs on borrowed capital are not included and no business or severance taxes are assumed. Production is assumed to be on the basis of one shift per day with a five day week. Surface restoration costs are assumed to be included, but mulching, liming, fertilizing and seeding expenses are not. Thus, additional reclamation costs would need to be incurred to the extent of reclamation desired.

The following two tables present the details of the capital and annual operating cost estimates.

Table II.2
Capital Investment Summary, Midway Mine

Equipment	Quantity	Estimated Total Cost
Bulldozer (D-9)	1	$40,000
Front end loader (5 yd)	1	30,000
Coal Crusher	1	75,000
Drill	1	5,000
Pump	1	3,000
Coal Hopper	2	2,000
Scales	1	15,000
Trucks (13 yd)	3	36,000
Fuel tanks	2	2,000
Welder	1	500
Other		
Office, shop & storage shed		150,000
Working Capital & Inventory (3 months operating costs)		45,400
		$403,900

Table II.3
Annual Operating Costs, Midway Mine

Personnel Costs	No.	Rate per Hour[1]	Days	Annual Cost[2]
Equipment Operators	2	$9.50	261	$39,700
Mechanic	1	9.50	261	19,800
Truck Drivers	3	9.60	130	30,000
Field Supervisor	1		261	20,000
Secretary/Bookkeeper	1		261	9,000
Shooting & Drilling	1	9.15	130	9,500
				$128,000
Operating Supplies				30,000
Indirect Expenses (15% of Personnel & Supplies Costs)				23,700
Total Costs				$181,700

1. includes wages, salaries, fringe benefits & payroll taxes
2. 2,088 hours per year.

b. Demand, Revenue, and Net Income Projections

Coal demand projections were developed as follows. The market to be served was assumed to be on-Reservation households and institutions as well as Labre Indian School and Northern Cheyenne families living in Ashland. Residential demand for coal was based on the constant vital rate population projections appearing elsewhere in this report and the 1975 Household Survey conducted by the Northern Cheyenne Research Project. Average household size, used to get the number of households from population, was assumed to be constant through time and equal to that in 1976. Eighty percent of the houses built after 1970 were estimated to have coal burning facilities and all new housing was assumed to have the same percent. Houses built before 1970 were assumed to be replaced or converted to coal at a rate of 10 percent every five years. Non-Cheyenne households were assumed to have the same demand and housing characteristics as Cheyenne households. Per household consumption of coal was assumed to be 10 tons per year. From the above, residential coal demand was projected to increase from 2,645 tons in 1977-78 to 4,764 tons by 1986-87. Institution coal use was assumed to reach 1,000 tons in 1986-87 from 400 tons in 1977-78. This increase assumes conversion to coal by the Busby School and Labre Indian School. These demand estimates are less reliable than the residential estimates due to lack of sound data and may be considered to be conservative. Total coal demand was projected to be 3,045 tons in 1977-78 and 5,764 tons in 1986-87.

Coal revenue projections were produced assuming delivered selling prices of $15, $20, and $25 per ton. Current prices of delivered coal is in the neighborhood of $16.50 per ton. All accounts receivable were assumed to be collectible. Average annual revenues were projected to be $65,000, $86,600, and $108,300 respectively for the above selling prices. These revenues with the above costs produced average annual net operating losses of $116,700, $95,100, and $73,400 respectively. If the initial capital investment in equipment and structures were financed wholly or in part through borrowing, losses would increase by the amount of interest payments. With the assumed costs and assumed revenues, opening the mine would clearly not be feasible unless the operating losses and initial capital costs would be financed through subsidies or grants.

Details of the above are presented in the following tables.

Table II. 4
Northern Cheyenne & On-Reservation Coal
Demand Projections, Tons

Year	Residential	Institutional	Total
1977-78	2,645	400	3,045
1978-79	2,823	466	3,289
1979-80	3,000	533	3,533
1980-81	3,224	600	3,824
1981-82	3,448	667	4,115
1982-83	3,732	734	4,466
1983-84	3,976	800	4,776
1984-85	4,220	867	5,087
1985-86	4,492	933	5,425
1986-87	4,764	1,000	5,764

Table II.5
Revenue Projections, Midway Mine

	at $15 per ton	at $20 per ton	at $25 per ton
1977-78	$45,675	$60,900	$76,125
1978-79	49,335	65,780	82,225
1979-80	52,995	70,660	88,325
1980-81	57,360	76,480	95,600
1981-82	61,725	82,300	102,875
1982-83	66,990	89,320	111,650
1983-84	71,640	95,520	119,400
1984-85	76,305	101,740	127,175
1985-86	81,375	108,500	135,625
1986-87	86,460	115,280	144,100

Table II.6
Net Income[1], Midway Mine

	at $15 per ton	at $20 per ton	at $25 per ton
1977-78	-136,025	-120,800	-105,575
1978-79	-132,365	-115,920	- 99,475
1979-80	-128,705	-111,040	- 93,375
1980-81	-124,340	-105,220	- 86,100
1981-82	-119,975	- 99,400	- 78,825
1982-83	-114,710	- 92,380	- 70,050
1983-84	-110,060	- 86,180	- 62,300
1984-85	-105,395	- 79,960	- 54,525
1985-86	-100,325	- 73,200	- 46,075
1986-87	- 95,240	- 66,420	- 37,600

1. Actual losses would be larger since these do not include interest costs.

c. Break Even Revenue & Tonnages with Alternative Financing Arrangements, Assuming Given Costs

The purpose of this section is to explore the break even production and revenue requirements under alternative financing arrangements at different assumed selling prices. The question asked by this analysis is what are the production and export requirements in order to break even at different assumed selling prices if the initial investment is financed in various alternative ways. The financing arrangements considered are 1) borrowing the initial capital at an 8 percent rate of interest 2) receiving a grant to finance the front end costs, but recovering the grant value at the end of the assumed 10 year equipment life and 3) a grant to finance the initial capital but with no recovery. Under the second, and third arrangements interest costs are avoided. In addition, the grant in the third case is used as a subsidy to revenue with no provision made for replacing the structures and equipment at the end of 10 years.

Initial capital costs of $403,900, annual operating costs of $181,700, and average annual Northern Cheyenne and on-Reservation coal use of 4,332 tons per year are assumed as before. Given this, the average annual revenue required to cover all costs including interest is approximately $245,000 if the initial investment is financed through borrowing. At selling prices of $15, $20 and $25 per ton this would require average production of 16,333, 12,250 and 9,800 tons per year. This would require average exports of coal off the Reservation of 12,000 tons,

7,900 and 5,500 tons per year. To the extent operating costs rose with increased production, break even revenues and tonnages would also have to increase. Also, no severance taxes are assumed. Should coal production on Indian land not be exempt from Montana State Severance taxes, exports would have to be increased to generate the revenue required to break even. Currently, these taxes are 34¢ per ton or 30 percent of contract price whichever is greater for 8,000-9,000 BTU/lb. coal with the first 5,000 tons produced per year exempt.

If the initial capital investment were financed through a grant so that there was no interest expense and if at the end of ten years the value of the grant were to be recovered, the average annual break even revenue would be approximately $225,000. Production and exports for the above prices would be 15,000, 11,250 and 9,000 tons and 10,700, 6,900 and 4,700 tons respectively.

On the assumption that the value of the grant were not recovered but allowed to be used to cover other costs, average break even revenue would be equal to operating costs of $181,700. For $15, $20, and $25 selling prices production and exports would be 12,000, 9,100 and 7,300 tons and 7,700, 4,800 and 3,000 tons respectively.

These results are summarized in the following table.

Table II.7
Break Even Tonnages with Given Costs

	Delivered Selling Prices		
	$15	$20	$25
Borrowing at 8%			
average annual production (tons)	16,333	12,250	9,800
average annual exports (tons)	12,001	7,918	5,468
Grant with recovery			
average annual production	15,000	11,250	9,000
average annual exports	10,700	6,900	4,700
Grant with no recovery			
average annual production	12,000	9,100	7,300
average annual exports	7,700	4,800	3,000

d. Break Even Costs with Alternative Financing Arrangements With Given Demand

This section is concerned with the break_even capital and operating costs at different assumed selling prices for meeting Northern Cheyenne and on-Reservation demand as stated previously under alternative financing arrangements. Assumptions include no export of coal, at 2 to 1 ratio of capital to operating costs, and alternative financing arrangements as before. Tabie II.8 presents the results of the analysis.

Table II.8
Maximum Feasible Capital & Operating Costs
to Meet Domestic Demand Under Different
Financing Assumptions & Selling Prices

	Delivered Selling Prices		
	$10	$15	$20
Borrowing at 8%			
Maximum Capital Costs	$64,000	$96,000	$127,400
Maximum Operating Costs	32,000	48,000	63,700
Grant with recovery			
Maximum Capital Costs	72,000	108,000	144,000
Maximum Operating Costs	36,000	54,000	72,000
Grant without recovery[1]			
Maximum Capital Costs			
Maximum Operating Costs	43,300	65,000	86,600

1. The value of the grant could be any amount and operating expense could be equal to annual revenue. The figure presented in the column is average annual revenue.

At a selling price of $15 per ton to domestic coal users capital and operating costs could not exceed $96,000 and $48,000 respectively if the initial capital structures and equipment were financed by borrowing at an 8 percent rate of interest. If the capital costs were financed by means of a grant and the value of the grant were to be recovered at the end of ten years, the maximum break even capital and operating cost would be $108,000 and $54,000 respectively. If the grant were to be totally used up at the end of ten years maximum feasibility operating cost would be limited by projected revenue.

For higher selling prices the maximum feasibile costs are, of course, greater. Lower prices mean lower feasible capital and operating costs. Whether or not producing the tonnages required to meet projected demand at reasonable prices is possible is a matter for further investigation. There is a real need for an engineering analysis for the purpose of developing a mine design which could (if possible) meet maximum

feasible cost parameters. It has been shown that grants can avoid interest costs as well as help cover capital and operating costs, and hence, raise the costs that can be incurred and still break even.

Other alternatives for lowering incurred costs might involve sharing costs of equipment with other activities and programs. For example, it is currently anticipated that a portable coal crusher will be purchased so that gravel can be crushed for road construction and maintenance when the crusher is not in use for mining. This arrangement might also be extended to other pieces of equipment. The condition necessary for this, however, is that the equipment must not be in continuous use for a single activity. In addition, if production of coal for use on the Reservation is seasonal, it may be possible to lower equipment costs by leasing some or all equipment on a short term, seasonal basis.

It should be emphasized that once exploration and engineering reports on the mine have been completed, more accurate and reliable estimates of feasibility with different pricing and financing alternatives can be computed in a relatively short time since the analytical routine has been developed and programmed on a programmable calculator. Also, if specific possibilities for reducing incurred expenses through cost shifting and/or subsidizing are identified, the feasibility implications of such reductions can be produced quickly and at low cost. In addition, alternative demand projections using different population assumptions are also possible on a routine and low cost basis.

4. Feasibility Analysis, 4.6 Million Ton per Year (MM-tpy) Coal Strip Mine

In the absence of the needed exploratory and engineering information for conducting a feasibility analysis of a large scale coal mine at a particular site, the approach taken here was to take available information concerning strip mining in the Northern Great Plains and modify this information to conform with specific conditions in the Tongue River Valley to the extent they are known and to conform with specific assumptions about the mine. It is assumed that the development of the mine is sponsored by the Northern Cheyenne Tribe, but no assumptions were made regarding ownership patterns, leasing arrangements, or management alternatives. Consequently, the returns as presented below and in Appendix A.4. include all returns to capital and do not reflect deductions for interest expenses and lease payments, nor the division of profits among the possible equity interests. Given the uncertainty regarding the taxing powers of the various levels of government with respect to Indian activity, no business taxes were assumed. Thus, returns as presented include potential tax liabilities. Potential tax liabilities of from 50 to 75 percent of total returns are not unreasonable if all business taxes are applicable. It is a matter for further assumption, analysis and negotiation how these returns would be distributed among the Northern Cheyenne Tribe, the State of Montana, the U. S. Government and private developers and financial groups.

Two separate analyses were made on the basis of alternative assumptions concerning severance taxation. In the first analysis,

no severance taxes are assumed to be applicable. In the second, a severance tax rate of 30 percent of contract price with the first 5,000 tons produced per year exempt is assumed. This is the Montana rate for 8,000-9,000 BTU/lb. coal.

No particular mine site was assumed, but the location is presumed to be in the Tongue River Valley of Southeastern Montana. An annual production rate of 4.6 million tons for the general market and a 20 year mine life are assumed. Average overburden depth is assumed to be 175 feet and average coal seam thickness, 50 feet. A 90 percent recovery rate is assumed. Transportation is assumed to be by rail with costs of transport facilities being borne by the railroad. Prices are assumed to be net of transportation charges or mine mouth prices. Current mine mouth prices in the area are in the neighborhood of $5 per ton. With delivered prices of $20 to $25 per ton in the midwest and unit train freight rates of from $8 to $10 per ton for a 1250 mile haul, negotiated contract prices from $5 to $15 dollars per ton are not unreasonable. All prices and costs are assumed to be in 1975 dollars. No attempt has been made to project inflation rates or changes in the price-cost structure of the mine.

Estimates of equipment, materials and personnel costs are based on Bureau of Mines Information Circular 8703, Basic Estimated Capital Investment and Operating Costs for Coal Strip Mines, U. S. Department of the Interior. The information presented in this circular is set

forth as representative of mining costs under Northern Plains conditions. Costs are based on 1975 indices and to some extent are outdated since personnel costs and union benefits are now covered by the Western Surface Agreement of 1975 and not the Bituminous Wage Agreement of 1975 as assumed in the circular. Unavailability of information regarding the former precluded use of the new wage rates in this analysis, but even assuming substantial increases in labor costs, the general results of this preliminary analysis remained unchanged.

Summaries of estimated capital and operating costs are as follows:

Estimated Capital Costs, 4.6-MM-tpy strip mine

Working capital	1,298,300
Initial Capital Investment	22,829,500
Deferred Capital Investment	17,145,600
Total Capital Costs	$39,975,100

Estimated annual operating costs, 4.6-MM-tpy strip mine

Production	893,950
Maintenance	416,800
Reclamation & Road Bldg.	175,600
Operation Supplies	2,070,000
Power	600,000
Payroll Overhead	557,750
Union Welfare	3,548,500
Indirect Costs	2,555,250
Total Operating Costs	$10,817,850

With estimated initial capital investment costs of approximately $23,000,000 and estimated annual operating costs of

nearly $11,000,000, it appears that a mine of this size would be highly profitable. Also, with an estimated 111 production, maintenance and management employees, the mine would offer considerable employment opportunities for Northern Cheyenne Tribal members if sufficient training were available. The following tables present estimated returns to the mine assuming different mine mouth selling prices. As can be seen, the rates of return on total capital as well as the annual magnitudes are substantial.

Table II.9
Estimated Revenue, Rate of Return and Average Annual Return for Different Mine Mouth Prices for Coal Assuming no Severance Taxes

Mine Mouth Price per ton	Net Revenue[1]	Internal Rate of Return (percent)[2]	Average Annual Return[3]
$ 5	$23,000,000	51.0	$11,648,500
10	46,000,000	152.7	34,867,500
15	69,000,000	253.6	57,895,600
20	92,000,000	354.4	80,903,200

1. after deductions for transportation charges

2. the expected percentage rate of return over cost on the initial invested capital but before business taxes, interest costs, and lease payments.

3. before business taxes, interest and lease payments which, if applicable, could reduce the average annual return by 50-75%.

Table II.10
Estimated Revenue, Rate of Return and Average Annual Return for Different Mine Mouth Prices for Coal Assuming a Severance Tax Rate of 30 Percent, the First 5,000 Tons Per Year Being Exempt

Mine Mouth Price per ton	Net Revenue[1]	Internal Rate of Return (percent)[2]	Average Annual Return[3]
$ 5	$16,107,500	19.1	$ 4,432,370
10	32,215,000	92.0	20,539,870
15	48,322,500	163.0	36,947,370
20	64,430,000	233.6	52,754,870

1. after deductions for transportation charges

2. the expected percentage rate of return over cost on the initial invested capital but before business taxes, interest and lease payments.

3. before business taxes, interest and lease payments which, if applicable could reduce the average annual return by 50-75%.

Under the assumptions made, 57.75 acres would be stripped annually. Over the 20 years the total stripped area would be 1,155 acres. It is assumed in the analysis that surface contours would be restored and that the stripped area would be mulched, limed, fertilized, and reseeded at a cost per acre of approximately $7,000. This cost is included in the above analysis. The effects of this stripping and reclamation on future land productivity and on water quality and drainage are not now known. Further study in this area would be required.

Details of the analysis are presented in Appendix A.4.

*5. Preliminary Economic Impact Analysis of a Large Coal Mine In the Tongue River Valley

In this section, the "first approximation" impact projection methodology and the impact projection for a large coal mine are presented. It would be worthwhile at this point to reemphasize a point made several times previously in this report concerning economic impact analysis and its role in Tribal decision making. This point is that the economic impacts of the development alternatives facing the Tribe are only one part of the total impacts which should be considered in evaluating the desirability of each of the alternatives when measured against the overall goals and values of the Northern Cheyenne people. Economic impact is important, especially in light of the current level of economic well being on the Reservation and the often expressed desire of the Northern Cheyenne to see it improved. But economic impacts are not all that is important. The Northern Cheyenne also have an expressed interest in maintaining their Tribal customs, values, etc., which are usually referred to by the broad terms, "Cheyenne way of life." They also have an active interest in preserving the physical environment of the Reservation and, by extension, its surroundings. Thus, both social-cultural and physical environmental impacts of development alternatives should also be analysed and projected. Only then will the Tribe be in a position to weigh the economic, social-cultural, and physical environmental benefits expected from each development alternative

against all the economic, social-cultural, and physical environmental costs that the development could be expected to impose on the people and, based upon this broad view, be in a position to make decisions in favor of those alternatives which offer needed benefits while imposing acceptable costs of all sorts.

The methodology used in this economic impact analysis is discussed first, followed by the impact projections. The feasibility analysis previously described provides the needed basic (or direct) employment and earnings information for the economic impact projections. The first approximation impact projection methodology is illustrated in Figure II.1.

The first approximation impact projection methodology is based upon a simplified and less rigorous and complete version of the economic impact methodology designed for permanent implementation which is described in Chapter III. Like the permanent impact methodology, this methodology utilizes the economic base approach as described in the permanent impact methodology discussion below. The economic base approach assumes that total employment is made up of basic and residentiary employment, where basic employment is defined as employment which produces goods and services for sale to customers outside the area, i.e., for export, and residentiary employment produces goods and services for local consumption. The basic employment sectors are referred to as the "driving sectors" of the economy. Residentiary employment is sometimes referred to as service or secondary or population

dependent employment. Total employment is the sum of basic and residentiary employment. It must be emphasized that the methodology referred to is an impact projection methodology. This methodology should provide a first approximation projection of the economic changes imposed in the area of the Northern Cheyenne Reservation as a result of major economic developments on or near the Reservation. The impact (or the changes) are measured as the difference between (1) conditions projected if the development actually occurs--the development projection--and (2) projected conditions if the event does not occur--the baseline projection. The impact projections would then be added to the baseline projections to give the projected total level if the development occurred. In this case, due to the first approximation nature of the impact projections and the absence of a baseline projection, this addition was not done.

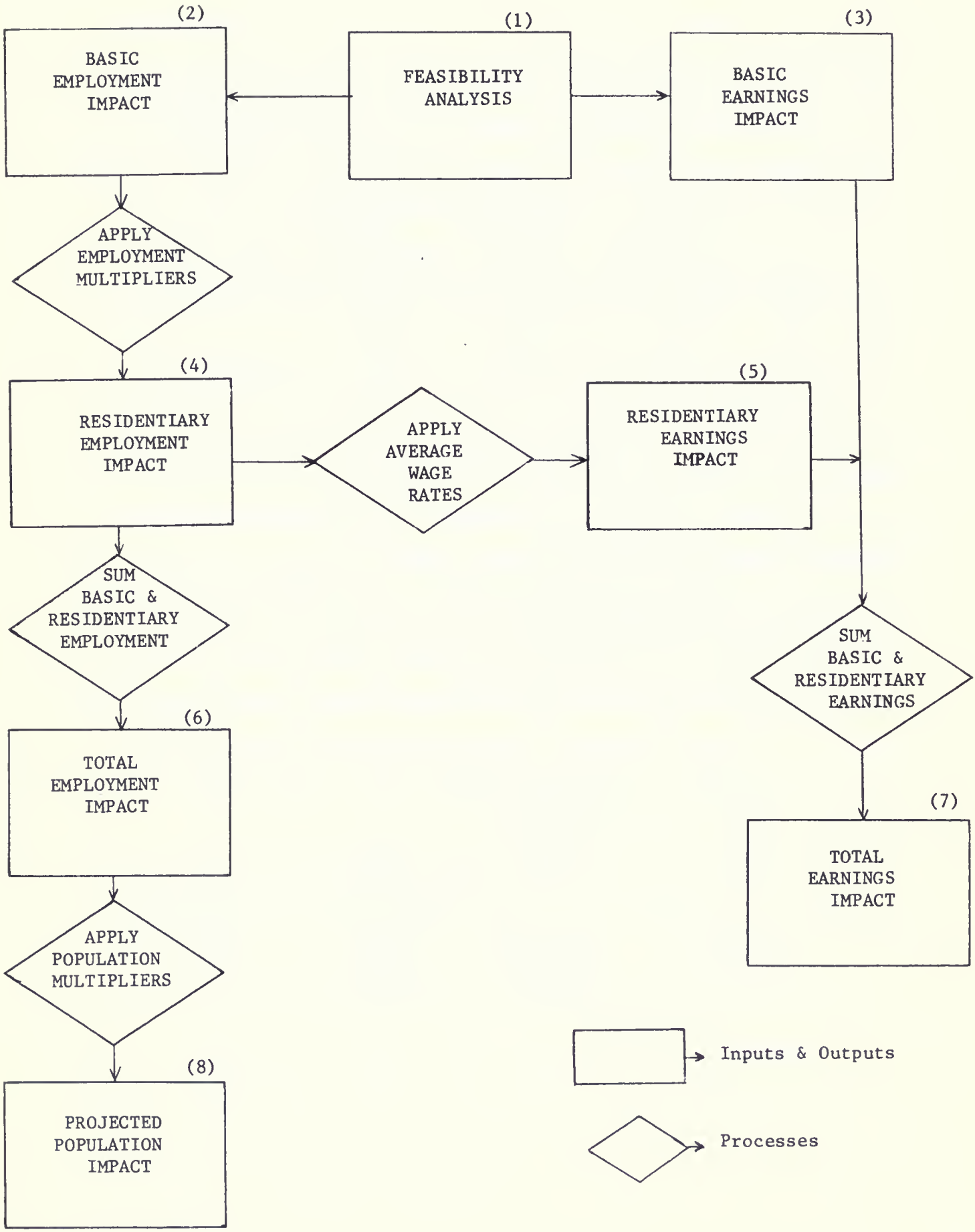
The first approximation method can be divided into four parts: 1) determination of basic employment and earnings, 2) determination of residentiary employment and earnings, 3) determination of total employment and earnings, and 4) development of the population projections.

The direct or basic employment and earnings impact will be felt in the immediate locale of the mine. Some of the direct impacts will extend onto the Reservation if Reservation residents secure employment in the mine or construction work forces and commute to work from the Reservation or if in-coming workers establish residence on the Reservation. Because of data

limitations, the indirect or residentiary employment and earnings impact and the population impact were projected for Rosebud County as a whole. Undoubtedly, some of this impact will be felt on the Reservation. This effect will be greater as more Reservation residents participate in the direct project work force and as on-Reservation businesses succeed in attracting trade away from off-Reservation competition. However, the data does not presently exist to make a Reservation only projection. Once the results of the public agency, business, and household surveys have been tabulated and analyzed, the data base will exist to make Reservation projections using the permanent impact methodology described below.

The BASIC EMPLOYMENT IMPACT (Box 2) and the BASIC EARNINGS IMPACT (Box 3) are determined from the development's project schedule as developed in FEASIBILITY ANALYSIS (Box 1). In most cases, the employment is divided into a construction work force and an operations work force. RESIDENTIARY EMPLOYMENT IMPACT (Box 4) is determined from the sum of all basic employment by applying sector specific multipliers. The multipliers used are based upon estimates of basic and residentiary employment for Rosebud County for 1975 made by the Montana Department of Community Affairs. These yield sector specific residentiary employment. RESIDENTIARY EARNINGS IMPACT (Box 5) is determined by applying sector specific annual average wage rates to estimated residentiary employment. The annual average wage rates used were determined from the 1974 Bureau of Economic Analysis records and adjusted to 1976 dollars as indicated by

Figure II.1
Flowchart of "First Approximation"
Methodology for one Projection Period



changes in the consumer price index over the period. TOTAL EMPLOYMENT IMPACT (Box 6) and TOTAL EARNINGS IMPACT (Box 7) are the sum of basic and residentiary employment and earnings. The POPULATION PROJECTIONS IMPACT (Box 8) were determined by using the 1970 population/1970 employment ratio from the 1970 Census for Rosebud County. This ratio was estimated to be 2.70. It was applied to the total employment to determine the projected population. This procedure was repeated then for each time period.

The projected impacts of a large (4.6 million ton per year) coal mine were developed utilizing the methodology described in the previous section. Two projections were developed for 1980 due to the transient nature of construction workers. It is well documented that construction workers do not demand the same type and amount of residentiary services as do permanent operations workers. This is due mainly to the short time span of the construction of projects. The first projection treats the construction work force as having one-half the impact of operations workers. The second projection treats the construction work force as having the same impact as operation workers. Thus, actual impacts should be between these two extremes.

The following is the time and manpower schedule for a large scale coal mine near the Reservation. This is the direct or basic employment.

	1980	1985	1990
Construction (CWF)	200	0	0
Operations	56	111	111
Total Direct	256	111	111

By applying employment multipliers to the basic employment, the following residentiary and total employment impacts were created.

	1980 (½ impact for CWF)	1980 (full impact for CWF)	1985	1990
Residentiary	246	410	177	177
Basic	256	256	111	111
Total Employment	502	666	288	288

As previously stated, the basic employment impact would be felt in the vicinity of the mine. The residentiary employment impact is projected for all of Rosebud County. Location within the county would be the subject of further analysis. This further analysis would properly include Tribal policy as well as economic decision making in the private sector. The same is true of the following earnings impact. From the feasibility analysis basic or direct earnings from the project are as follows:

(1976 Dollars)

	1980	1985	1990
Construction	$4,301,200	$ 0	$ 0
Operations	697,175	1,394,350	1,394,350
Total	$4,998,375	$1,394,350	$1,394,350

The residentiary or indirect earnings, determined from average annual wages for employment sectors and total earnings is as follows:

(1976 Dollars)

	1980 (½ impact of CWF)	1980 (full impact of CWF)	1985	1990
Residentiary	$1,932,341	$3,219,493	$1,348,928	$1,384,928
Basic	4,998,375	4,998,375	1,394,350	1,394,350
Total	$6,930,716	$8,217,868	$2,779,278	$2,779,278

Population impacts from this level of employment were determined by applying the 1970 Census population/employment multiplier for Rosebud County (2.70) to each of the projected employment impacts. This multiplier appears quite high relative to similar experience elsewhere. Thus, these population impacts may be higher than realistic.

The population impact is as follows:

1980 (½ impact of CWF)	1980 (full impact of CWF)	1985	1990
1,355	1,798	777	777

More detailed information on these projections are attached in Appendix A.5. This includes listings of the multipliers used, the annual average wage rates, and the detailed residentiary employment and earnings information.

This concludes presentation of the intermediate layer of analyses carried out in this project. It is hoped that the two objectives of the chapter have been met: (1) presentation of useful, if first cut, projective and analytical information and (2) presentation of examples of the types of analysis which the NCRP would be able to carry out routinely if the proposed decision information system, including its analytical components, is implemented at the NCRP. The proposed decision information system itself is extensively discussed in the next chapter.

CHAPTER III

PURPOSE AND NATURE OF THE PROPOSED NORTHERN CHEYENNE DECISION INFORMATION SYSTEM

As was emphasized in Chapter I, the purpose of the economic consultants to the NCRP in this project was not to produce a "study" per se of the Reservation and its surrounds. Rather the primary purpose was to design a decision information system for future implementation in the NCRP which would allow the Project to serve Tribal decision makers as a permanent source of data, analysis, and information to support their planning and decision making functions. This section addresses the issues, first, of the general role and nature of an information system in the context of a political decision making body such as Tribal Government and, second, of the specifics of such a system for implementation in the NCRP including an informal discussion of the feasibility and input analysis methodologies designed for implementation as part of the NCRP decision information system. It must be remembered that the purpose of this year's project was design. If the design proposed here meets approval, then funding can be sought to undertake an implementation project. The Rho Corporation expects that such a project would require one full year to complete and would establish in the NCRP a fully functional system as described in this chapter, including the feasibility and impact analysis capacities, and requiring only minimal reliance on outside consultants,

primarily in the area of specific industry characteristics required as input into particular feasibility analyses.

A. GENERAL FUNCTIONAL DESCRIPTION OF AN INFORMATION SYSTEM IN THE DECISION MAKING CONTEXT

The simple premise upon which the concepts developed here are based is that when important decisions are made it is preferable that they be based upon as much information as possible about what alternatives are available and what the implications of each are. This premise seems perfectly obvious when stated, but in real world decision situations the importance of an adequate information base is often forgotten or ignored. To some extent, this situation derives from the need to make decisions rapidly, and thus, without time to secure available information. More often, however, the reason decisions are made in the absence of a reliable information base is that no system is available to the decision maker to provide him the required types of data and the expertise to organize and analyse the data into information directly or even indirectly relevant to the decision he faces. Alternatively, this data and expertise, while known to exist, may be beyond the time and money resources which the decision maker can devote to information generation. The purpose of the proposed information system is to provide the NCRP with the capacity to provide the data and analytical, i.e., information generation, support required by Tribal decision makers on a routine, low cost, and importantly, unbiased basis.

Perhaps the nature of a decision information system can be further illustrated by considering the types of uses to which it would be put and by whom it would be used.

1. Users of the System

Potential users of the proposed system on the Northern Cheyenne Reservation include virtually all persons concerned with Tribal decisions. Obviously, the Tribal Council and President are involved in major decisions which will have far reaching impacts on the well-being of the Tribe and its members. Perhaps the most obvious of these is the decision regarding whether to develop Tribal coal resources and if so what form of development would take. Other such major decisions are illustrated by the decision to undertake the EPA Class I air designation effort.

At a different level, much planning and decision making of both a policy and a day to day operational nature is the responsibility of the functional agency heads and directors. It is the function of these people to administer their programs so that agency spending produces as much service to the people as possible or, perhaps, that required services are provided at the lowest possible cost.

Also on the Reservation are such agencies as CDC and EDA whose purpose is explicitly to promote economic development on the Reservation. Information regarding both the economic feasibility of proposed

developments and the nature and extent of their impacts on Reservation economic, social, cultural, and physical environments should be essential in guiding these agencies' decisions.

Finally, since it is they who will ultimately receive the benefits and pay at least some of the costs of most Tribal decisions, Tribal members at large must play a role in decision making. While this role may not always be a direct one, it should always be based upon a reasonable information base. In some cases, direct participation may be called for as in the case of a prospective Tribal referendum on coal development. Here especially, an electorate informed on both the economic feasibilities and the socio-economic-environmental impacts of proposed alternative courses of action is essential to arriving at a wise choice through the referendum.

2. Uses and Types of Decisions

The uses of a decision information system by each type of user discussed above in terms of examples of the decisions they make and planning they carry out are outlined here. At the general policy level of the Tribal Council and President, it is recognized that two of the most pressing problems facing the Northrn Cheyenne are poverty and limited revenue to support Tribal Governmental operations. It is clear that the current high price of coal and the large deposits of it on the Reservation make coal development on the Reservation a possible source of money income for solution of the personal poverty

and Tribal revenue problems. However, as shown by the Reservation coal lease program and the difficulties arising from it, the existence of these coal deposits does not guarantee development of them which is favorable to the best interests of the Northern Cheyenne people. Thus, many decisions remain to be made before coal development on the Reservation, if any, is undertaken. Elected Tribal officials are properly reluctant to make these decisions in the absence of information about each of the several alternatives being considered. This information is of two kinds: (1) the feasibility sort; i.e., the question is raised of the ability of a proposed project to generate enough sales to cover its development and operating costs and, perhaps, return additional revenue to the Tribe to support governmental operations and provide a fund for disbursements to Tribal members; and (2) the impact sort, i.e., the issue of the total effect a proposed project will have on Tribal well-being. This impact question leads to many types of considerations or dimensions. It may be that a feasible project would provide sufficient net revenue to the Tribe to finance governmental operations at the desired level and to support substantial annual disbursements to Tribal members in perpetuity. Along this dimension, then, the proposal may appear desirable. It may also be the case that the project would require a substantial influx of population and these people may get the better, higher paying jobs so that Northern Cheyenne workers are actually moved down in the income distribution even though their actual incomes may rise.

This may or may not be a desirable effect of the project depending upon the desires of the Tribe. Further, more jobs, housing, etc., will be generated indirectly by the project as those who get jobs in a given mine, whether they are Northern Cheyenne from the Reservation or not, demand more locally sold goods and services, housing, etc., than would be demanded without the development. Northern Cheyenne can expect to participaete in the benefits of such indirect effects to some extent and also to bear the costs in terms of greater congestion, a larger non-Indian population, etc. Again this may be desirable or undesirable depending upon the desires of the Tribe. Clearly, any larger scale strip mine would impose environmental costs on the mine site, on transportation routes, possibly on more remote parts of the Reservation surface and ground water system, etc. This aspect of the project would, in all likelihood, be clearly undesirable. Cultural impacts should also be considered and may be either positive, say, through increased ability of the Tribe to finance cultural preservation undertakings or negative as a larger non-Indian population impacts upon the local area.

The purpose of presenting this discussion is to illustrate the many types of information required before a well informed, wise decision among available alternatives can be made. It should be clear that the information system is intended only to provide as much of the information as possible and not to reach a decision by itself about the desirability of proposed projects. The desirability issue is one

which requires the judgement and wisdom of the people involved in the decision about trade-offs between those impacts of a project which will favorable affect Tribal well-being and those which will adversely affect it. The information system is intended to provide the decision maker with information about the types and magnitudes of project impacts.

Turning now to the level of program administrators, their planning and decision making are also subject to substantial information requirements. For example, the Community Health Representatives (CHR) program should expect to be required to concentrate on a different set of health problems if a significantly younger population is established on the Reservation as a result of either decreased out-migration, or of in-migration, resulting from some major development project than if an older population is expected to result from continued out-migration due to lack of economic opportunity. Similarly, the problems the CHR program should plan for will vary with expected personal incomes, changes in public sanitation systems, etc. Finally the resources this program will have to work with might be substantially higher with a development project than without it and this should significantly influence program planning and decision making.

3. Design Implications

Perhaps a few implications can be drawn from the preceding discussion regarding desirable conditions for a decision information system:

First, the information system is designed to produce must address the dimensions of Tribal welfare which are thought to be relevant by planners and decision makers. That is, Tribal decision makers must be provided with information which addresses issues in which they are interested in terms of conditions and changes in conditions which are important to them.

Second, a decision information system must deal with both data per se, i.e., with factual descriptions of historical and current conditions and with analysis i.e., with the capacity to draw implications from the data which is relevant to the decisions and plans being made.

Third, the analytical capacity must include the capacity to prepare new analyses as required and not consist of a single study done for some particular purpose at any one time. Also, this analytical capacity must be flexible and rather wide-ranging in order to meet the variety of information requirements.

A further consideration includes the costs of research. Cost goes up as the level of detail in the information provided increases. Consequently, the level of detail desired must be chosen with cost considerations in mind.

Fourth, the analytical capacity must include the ability to project future impacts since, obviously, many of the most important decisions to be made consist of selection among available courses of action based upon their expected future implications for Tribal well-being.

Fifth, the requirement for projective analytical capacity leads to probably the most difficult aspect of both the analytical capacity itself and of the use of the information produced in planning and decision making. This aspect is that projecting future conditions must be done under conditions of uncertainty. Thus, what are projected are expected future conditions. However carefully these expectations are formulated, it must be recognized that any one projection is quite likely to prove wrong in the sense that the actual outcomes may differ significantly from projected conditions. No projection methodology, no matter how sophisticated, is exempt from this difficulty. The approach recommended here is to deal with uncertainty by projecting the impact of a range of reasonable assumptions so that information concerning as narrow a range of plausible impacts as possible can be provided. Other options would be some form of probability statement about each projection intended to indicate the likelihood that the projection would be realized. These alternatives were rejected because, first, they do not provide information about what conditions to expect if they are wrong or about how far wrong they might be or about what might cause them to be wrong and, second, because the theoretical conditions required in designing such a methodology are not met in this type of application.

Sixth, to be accessible to the wide variety of users and potential users, it is necessary that the decision information system be organized

in such a way that it can carry out its library functions effectively and efficiently. These functions consist of (1) input-acquisition of new data in terms both of updating existing data series and of accessing newly found or desired types of data not previously included in the system; (2) storage of data in a well organized manner so that users know what data and analytical information is available and how to access that information they require; (3) dissemination of available data to users either in response to specific special requests or as part of a routine dissemination schedule. Closely related is the maintenance of capacity to carry out analyses as required; i.e., to receive information requests, decide upon proper analytical procedures for meeting the request, carrying out the required analyses, and report the results-implications to interested users, either the ones submitting the original requests or other persons with legitimate interest or both.

This discussion has attempted to describe and illustrate the general nature and uses of an information system in the context of Tribal decision making and planning and to derive some general characteristics such a system should embody in order to be useful for the described purposes. The following section addresses specific design considerations for the information system designed for subsequent implementation at NCRP.

B. SUGGESTED INFORMATION SYSTEM DESIGN

This section will discuss a proposed decision information system for future implementation in the NCRP in the context of the foregoing discussion of the general nature and purposes of such a system. A formal design of the system does not appear in the discussion. Rather what is developed is a set of considerations which would form the framework of a design process which would produce the formal information system design; a description of the permanent feasibility and impact analysis methodologies as designed for future implementation; and a short discussion on the manpower requirements for such an information system. Although this section deals primarily with the economic component of such a system, it must be remembered that information generated by other disciplines, including sociology, geology, etc., should also be a part of the overall decision information system.

This section is organized as follows. First, a discussion of the library functions of the information system, consisting of a storage component, an input process, and a dissemination process is presented. Second, a short discussion on required capacities appears. Third, the permanent feasibility and impact analysis methodologies, as designed for future implementation will be described. Finally, manpower requirements will be briefly discussed.

1. Library

a. Storage System

The type and structure of the storage system is discussed first since the storage component must control design of the input and output systems.

There exist two possible types of storage systems which could be utilized in this type of an information system; 1) a computerized system and; 2) a paper filing system. At this point in time, it would seem that the paper filing system would be the most feasible. It appears that a paper filing system could support required storage, access, and dissemination functions effectively and efficiently.

In order to provide required organization, it would be necessary for a central data directory to be developed. This would be the key to the information system. The data directory would describe each data element in terms of the following:

1) what the data element consists of;
2) the location of the data element;
3) the source of the data element;
4) a date of creation of each data element.

The data directory would have to be centralized in the NCRP and constantly updated as each new data element is entered into the storage system.

The data elements themselves do not need to be centralized in one place. While a majority of the data may be located in the NCRP, some data elements which are listed in the data directory and are necessary elements of the system may be located in other offices. An example of this would be the Tribal Comptroller's records. While these records are valuable to the decision making process, and therefore should be incorporated in the information system, they should probably continue to be housed in the Tribal Comptroller's office. Entries in the data directory for this information should be created and maintained as part of the information system.

As may be clear after this brief discussion of a storage system, the organization of a storage system is central to the usefulness of the information system as a whole. Seven possible principles of organization are suggested here. Others may be suggested in future discussions.

1) "update schedule" Some data elements will be updated regularly. Others may be updated on an irregular basis and some may never be updated. The storage system could be organized according to these schedules.

2) "source" The original source of the data may be the basis of organization of the storage system. Some examples would include: Northern Cheyenne Tribal Government; Other government; and Northern Cheyenne Research Project data and analysis.

3) "type of data" This refers to the type of data headings which were expressed in Chapter IV. Examples of this type would include demographic data, economic data, housing data, etc.

4) "primary or secondary data" Definitions of this type of data are also of Chapter IV. For instance, this data collected from the Bureau of Economic Analysis.

5) "directly usable vs. requiring analytical manipulation" Some data elements may provide helpful information without manipulation. However, other data elements will require analytical manipulation of some nature before they can provide any useful information.

6) "primary users" This type of organized structure would distinguish between the information usually provided to each the user types described in the previous section. The Tribal Council and President will usually require different data elements than program administrators. The information could be organized on this basis.

7) "confidentiality control issues" Undoubtedly some of the data elements in the information system will be confidential for one reason or another. The storage system could be organized so that the confidential files are entirely separate from the other data.

It is expected that some combination of the seven suggested principles of organization would be incorporated in the final design of the storage system. It is most likely that a hierarchical organizing scheme would provide desirable incorporation of the principles described above. An example of this system is shown in Figure III.1. This is not to suggest that this particular structure should be chosen. It is merely an example of a hierarchically organized storage system. Final design should be the result of a series of experiments by users and operators of the system so that the most useful and efficient organization can finally be developed.

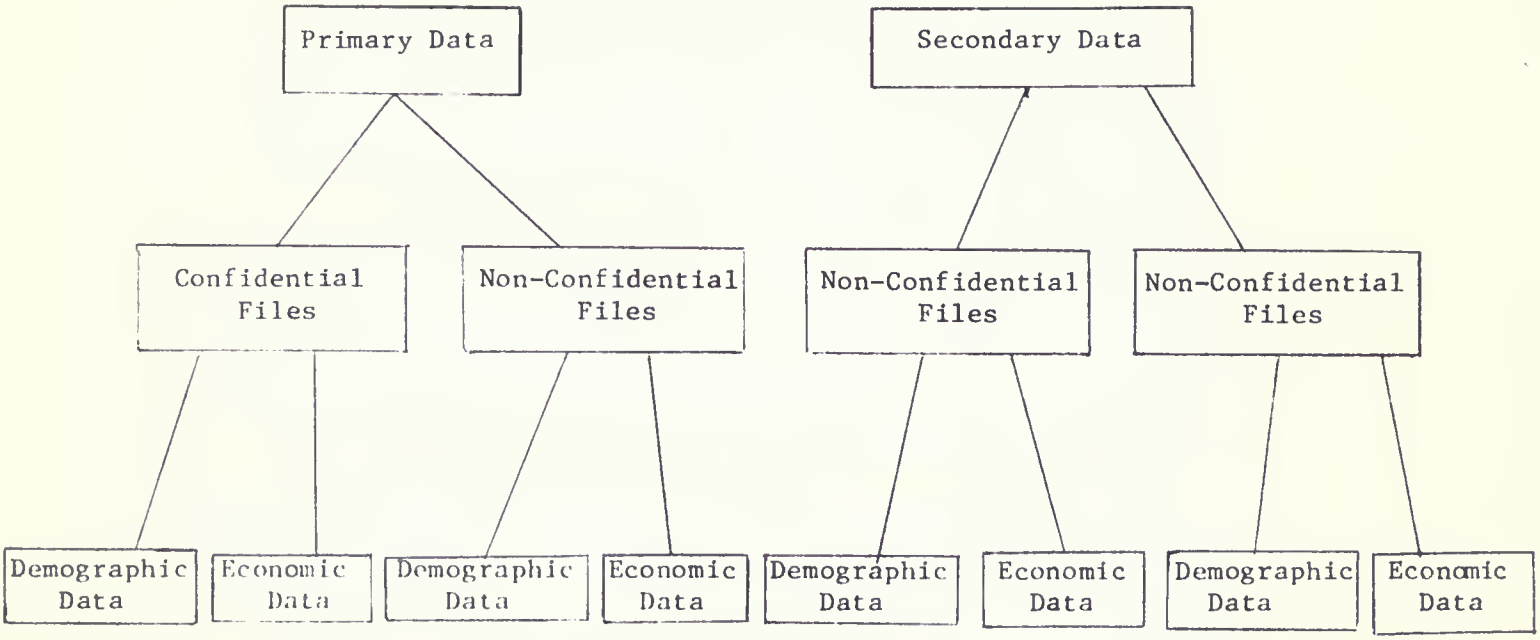
b. Input System

Once the structure of organization is selected for the storage system, an input system for this storage system must be developed.

Figure III.1

Example of a

Hierarchical Storage System



The input system developed will have to be able to accomplish the following tasks. First, a routine access system will have to be developed for securing regularly updated data from routine update sources. This data must then be organized and placed in the storage system. Second, a less routine system will have to be developed for accessing and inputting data produced "from time to time" by various sources. Third, the system should be developed to handle a one time entry for information elements that do not change over time. An example of this type of data would be results of a core sample done by the geologists on the Reservation. Fourth, the system should include a routine method for inputting the analyses carried out by the NCRP. This would include not only feasibility and impact analyses, but also any hydrological, sociological, geological, etc., analyses which have been or will be carried out by the NCRP.

These four elements of the input system are essential. The process must be developed in order to not only update information in the storage system, but to add entirely new data elements into the system.

c. Dissemination

Once the data elements are collected and input into the storage system, a system of dissemination must be developed in order to get the information to users. Routine reporting systems for the Tribal Council and President, for project administrators, and for the

Northern Cheyenne people must be developed. Each type of user has its own needs, as described in the previous section. The reporting system would be in the form of regularly published documents tailored to each group of users. The type of system developed will have to fit the users' needs. The dissemination system should also be equipped to handle special requests from users when the need arises.

The dissemination system should also be capable of handling special request analysis projects. The capability should exist to tell the user how long such a project would take, the cost, and the quality of the output. In the case of a request for economic information, it may require the usage of the permanent implementation feasibility or impact analysis methodology discussed later. The request may be for some statistical analysis on some data in the storage system. The request may also require some analyses from other fields. Whatever the case, the dissemination system should be set up to receive these requests and proceed on them.

Dealing with the problems of confidentiality control is an essential element of the dissemination component. As previously stated, there will exist some data elements which are confidential and may only be accessed by a few people. A determination of confidentiality problems associated with the information in the system will have to be made on a case by case basis and rigorous procedures set up to prevent improper disclosure.

2. Manipulation

This component of the information system can be viewed as a combination between pure library functions and extensive analytical functions as described below. Some change in form of information is expected, largely to make information more easily assimilable. Required analyses are expected to be very simple, involving such procedures as computation of sums, averages, percentages, percent changes, etc., and possibly preparation of graphical and narrative presentations.

*3. Analysis

The next section describes the permanent feasibility and impact analysis methodologies designed by Rho for implementation at the NCRP. The analyses should be considered as part of the decision information system. The techniques discussed here have been designed in anticipation of the absence of a computer. It is anticipated that the minimum computing hardware requirement would be a programmable hand held calculator with printer attachment costing approximately $500 total. Both the feasibility analysis and the demographic component of the economic impact analysis routines are currently operational on Rho's Texas Instruments model SR-52. Transferral to similar equipment at NCRP would be a routine task. Of course, since

the economics component of the impact projection methodology is not yet complete it has not been installed on any hardware.

It must be pointed out here that the feasibility and the demographic component of the impact projection methodology designs can be viewed as virtually complete. Due to late availability of required data, the economics component of the impact projection methodology has not been able to be completed or evaluated. Thus, the formulation presented here, and especially the explicit formal statement of it found in Appendix B.2. must be taken as provisional and subject to extensive revision during implementaiton. The process of revision during implementation is a routine part of any such methodology development-implementation project.

C. FEASIBILITY ANALYSIS--GENERAL METHODOLOGICAL STATEMENT

The objective of feasibility analysis is to provide information for decision making about a specific project or enterprise where the project or enterprise is engaged in the production and distribution of goods and/or services. As applied to decision making, this type of analysis addresses the problem of the viability of an undertaking in terms of the surpluses (profits) or deficits (losses) that it can be expected to generate. A project or enterprise is said to be feasible if the anticipated revenues equal or exceed the anticipated

costs. Infeasibility indicates that a project cannot be expected to generate sufficient revenues through the sale of its product to cover its set-up and operating costs.

In the context of Tribal decision making feasibility analysis produces a limited but essential set of information about the viability and revenue generating capabilities of specific projects and ventures. Being restricted in its concerns, it does not nor is it intended to provide all the information that is desirable for decisions made from the point of view of the general welfare objectives and functions of the Tribal government. Needless to say, decisions concerning the development of Tribal resources involve choices among numerous alternatives along dimensions other than just the returns to the enterprise or project. These choices can affect the anticipated revenue and costs streams of the enterprise, and therefore, the return on invested capital by their effects on productivity and on prices charged or paid. Moreover, and perhaps most importantly, they can have substantial effects on the distribution of returns among various interested parties as well as on the distribution of business receipts and labor incomes among different population groups. Additional information about the effects of these alternatives is thus required before decisions are made. These alternatives include but are not necessarily limited to the following:

1. Alternative Ownership patterns - who owns the enterprise and participates in profit distributions.

2. Alternative forms of business organization -- the extent of integration of processes into one enterprise verses numerous small scale operations. Also, corporate vs partnership vs proprietorship.

3. Management alternatives -- who and the basis of compensation.

4. Alternative financial arrangements sources of capital investment: Tribal equity, individual Tribal members equity, outside equity, borrowing from various capital markets, Community Development Corporation loans, and grants.

5. Leases and Royalty alternatives -- lease vs. direct ownership; specific vs. ad valorem royalty rates.

6. Alternative development sites — what are the environmental costs, the effects on displaced economic activity and the effects on returns to the enterprise.

7. Alternative labor policies -- who has preference for jobs, and recruitment and training policies.

8. Alternative pricing policies -- maximizing returns to the enterprise versus distributing returns through lower prices to selected customers.

9. Alternative procurement policies -- preferential treatment of supplying firms or individuals.

In this larger context, decisions regarding resource development would tend to be concerned with both the magnitude of income (labor as well as property) produced by a development and the distribution of that income to the Tribe and Tribal members. Feasibility analysis in this context indicates whether or not a particular development by itself can be expected to be a viable undertaking, and if not, the extent to which subsidies would be required to maintain it as an on-going operation. By itself, a declaration of feasibility does not imply desirability, nor does it indicate which of several alternatives

is to be preferred. Only in the instance where the decision making criteria is that of maximizing profits or net returns does feasibility analysis portend to be prescriptive.

At this point it should be noted that, done properly, feasibility analysis often requires a great deal of technical and highly specialized information as input. For large and complex enterprises, development of this information may involve experts in business organization, finance and management; marketing and transportation specialists; legal and tax authorities; as well as hydrologists, geologists and engineers. For smaller and less complex enterprises the number of specialists required is likely to be less. Also, it is often the case that consulting firms specializing in a particular kind of enterprise can provide all the technical and analytical input required. As a consequence, what is proposed here is a general system of feasibility analysis which can be used by the Tribe as a screening device for various alternative developments whereby unattractive alternatives can be dropped and more promising ones can be subjected to further and more intense investigation and analysis by the requied specialists. Of course, given the interests of the Tribe, it may choose the extent to which it develops its own staff capability for this more detailed and specialized analysis.

It should also be noted that there is no universally accepted standard or procedure for doing feasibility analysis. All variants,

however, are concerned with generating some measure of the enterprise's profitability or net revenue producing capability. Simple and less costly procedures usually involve developing pro forma income statements and balance sheets for the first few years of operation. Net profit and net worth are thus the primary decision making variables. More sophisticated versions involve discounting at a specified interest rate the anticipated future cash flows (net profits plus depreciation) over the duration of the enterprise's life as a measure of the present value or worth of the enterprise. Comparing the present value of the cash flow to the present cost or initial required investment gives a measure of profitability. The variant proposed here and explained below is known as the "expected internal rate of return over cost on invested capital." This variant has some theoretical superiority over other versions of feasibility analysis. Also, the computational costs have been greatly reduced by the advent of relatively low cost programmable calculators. Moreover, its concentration on the rate of return (a percentage rate) on invested capital permits easily understood and useful comparisons between expected rates of return from various alternative undertakings as well as comparisons between rates of profit and borrowing rates. In addition, it is highly flexible in that present value and present cost information can be generated using the same calculation procedure by simply redefining two of the variables.

Conceptually, the problem addressed by this analytical procedure is as follows. An initial capital investment in plant and equipment and working capital is to be made in starting up a business enterprise or developing a resource. This capital is then to be used in conjunction with other inputs in the form of labor, raw materials, etc., to generate production outputs and a stream of revenues through time. In addition, the labor and raw material inputs generate a stream of costs through time. Also, the initial plant and equipment need to be maintained through time by a series of repair and replacement expenditures. The difference between these streams of revenues and costs is net revenues before deductions for interest costs and depreciation charges. Rate of return analysis expresses this time series of net revenues as an expected internal rate of return on the initial capital investment. If the internal rate of return of this particular investment is greater than the borrowing interest rate, positive net returns to the enterprise are expected. If below, losses are expected to result. In the case of equity capital, if the internal rate of return exceeds ratesof return from other potential investments, greater profits are expected by investing in that alternative, and vice versa, if less. In all cases, losses are expected if the internal rate of return is negative. With internal rates of return less than the borrowing rate in the borrowing case or negative in the equity case, subsidies would be required to cover operating losses if the decision were made to go ahead with the investment.

An interesting and useful variant of this analysis is to solve for the minimum price that could be charged for a product in order to cover various kinds of capital and operating costs given assumptions about the volume of production and a minimum necessary internal rate of return for meeting interest charges. Following this, a demand analysis of the Reservation or perhaps the Reservation and surrounding area would indicate whether or not the local market would support that level of production at that price. For example, if a project were being considered to provide a certain good or service to the residents of the Reservation at the lowest possible price and given estimates of output, capital and operating costs, the minimum price could be computed for different financing alternatives. If all the capital costs were met by borrowing, the minimum r would equal the interest rate. If part were financed through grants or equity capital and no return on these were expected, the minimum r would be equal to $\frac{i \times PC_1}{PC_1 + PC_2}$ where i is the rate of interest on borrowed capital, PC_1 is the borrowed capital, and PC_2 is the sum of equity and grant capital. This would, of course, yield a lower minimum price. If grants were received for investment and no recovery of the initial grant were necessary or desired, the present cost would be set equal to the amount of borrowed capital and r set equal to i in solving for the minimum feasible price. In this case the price would be lower than the former two cases. Comparison of these prices with

current and expected market conditions would indicate the feasibility of the project alternatives.

Feasibility Analysis Methodology

Internal rates of return are computed using the following equation.

$$PC = \sum_{t=1}^{T} \frac{Q_t}{(1+r)^t}$$

Where:

PC = present cost or initial capital investment

Included are:

1. Enterprise organization costs (legal, financial, marketing, management, transportation & accounting)
2. Siting costs (exploration, surveying)
3. Design costs (engineering, architectural)
4. Construction (site preparation, structures, road building)
5. Equipment
6. Staffing (recruitment, training)
7. Acquisition of land & rights
8. Working capital & inventories

Q = (Expected Net Revenue - Expected outlays)

Included in expected net revenue are:

1. Gross sales from products produced (price x quantity)
2. less transportation costs
3. less severance taxes

4. less bad debt expenses

5. plus salvage value of used equipment, inventories, facilities, land & rights

Included in expected outlays are:

1. Personnel costs (wages & salaries, payroll taxes, fringe benefits, union welfare)

2. operating supplies

3. inventory adjustments

4. power

5. rents, licenses, royalties & fees

6. indirect expenses

7. taxes & insurance

8. equipment replacements (other capital investments)

r = expected internal rate of return over cost excluding interest on initial capital investment

T = number of time periods

t = time periods, t = 1,2,3,...,T

The right hand term in the equation is the present value of the enterprise as measured by discounting the expected future net returns at rate r. With the present value set equal to the present cost (the left hand term), r is the unknown. Solving for the r which equates the present value with the present cost yields the expected internal rate of return.

The main difficulty with doing feasibility analysis is in producing estimates and projections of capital costs, operating costs, and

revenues. Estimates of present capital costs can be made using current market prices. Projections of future costs and revenues, however, are more difficult to produce and must be made on the basis of expected future market conditions. Numerous techniques exist for making projections of costs and revenues but these should not be used uncritically. The reason is that, for any project, projecting revenues and costs is likely to involve consideration of conditions unique to the project, industry or area. Consequently, these projections must largely be made on an ad hoc basis using whatever techniques appear to be appropriate in each specific case.

In addition, it will be necessary for the analyst to become familiar with the production, transportation, and marketing characteristics of the industry being considered. This, in turn, requires the analyst to develop contacts with experts, either academic or practical or both, in the industry. Locating and drawing on such expertise to develop estimates and projections of cost, revenue, and financial conditions for the development being considered will, in each case, be an important part of the overall feasibility analysis.

*D. IMPACT ANALYSIS METHODOLOGY

The purpose of the impact analysis system discussed here is to provide NCRP with the ability to project the results of major economic developments on or near the Northern Cheyenne Reservation in terms of

the changes they will make to economic conditions on the Reservation. These changes are to be projected as the difference between (1) projected conditions if the development actually occurs--the development projection--and (2) projected conditions if the event does not occur--the baseline projection. The primary purpose of this project has been to design the impact projection methodology for implementation in the future. Thus, what is discussed here is the analytical system itself rather than its application to any one potential development. A "first approximation" analysis of a few of the potential developments facing the Northern Cheyenne constitutes a secondary purpose of the project. This analysis, based on a less rigorous and complete version of the methodology described here is presented in Chapter II.

In designing the impact projection methodology described here three central issues guided design decisions: (1) the kind of approach to use; (2) the data base available for use in applying the methodology; and (3) the types of information which would be most useful to Tribal decision makers.

In resolving the general nature of the first issue, it was decided that a combination of the "three component cohort survival" and the "economic base" methodologies should be adopted. It should be noted that much of the impact modelling work being done currently is of this sort and that much of Rho's past experience is based on this approach.

The "three component" method is based on the simple notion that population change in an area from one point in time to another must consist of three components: (1) births, (2) deaths, (3) migration. The number of births projected to occur is added to the initial population, the number of deaths is subtracted, and either net in-migrants are added or net out-migrants are subtracted. Well established techniques have been adapted for projecting the first two components, births and deaths. The third component, migration, is projected as two sub-components (a) that which occurs in response to economic opportunity and (b) that which does not. Projection of the first, economic opportunity related, part of migration is based upon projected job opportunities in the area and is based upon the concept of economic base as discussed in the next paragraph. Projection of the second, non-economic opportunity related, sub-component of migration is incorporated with the births-deaths projection calculation routine.

The economic base approach is based upon the theoretically and empirically reasonable notion that in small, open economies such as that of the area of the Northern Cheyenne Reservation, the "driving sectors" of the economy are those which "bring money into" the area, either through exports, i.e., through production of goods and services for sale to customers living outside the area, or through net in-transfers or grants of monies in such forms as welfare payments or federal grants to support Tribal (or state or local) governmental operations. Economic

base theory holds that, given some level of basic activity, as measured, say, by employment, a substantial amount of additional activity will be required in the area to produce the goods and services needed both by those engaged in basic activities and by those engaged locally in producing these goods and services. Local production of goods and services for local consumption is referred to as service or residentiary or population dependent activity. Total activity, then, consists of the sum of basic plus residentiary activity.

The economic base approach is especially well suited to impact modelling as described here because most of the major developments whose impacts are to be analysed and projected constitute changes in basic activity. For example, any coal based development of any size would be undertaken primarily for the purpose of exporting an energy resource, in some form, to distant markets. Similarly, any expansion in grazing activity would have as its primary economic purpose the export of meat products to distant markets. Thus, these developments can be viewed as changes in basic sector activity and an economic base methodology can easily be designed to project the total impacts, including residentiary impacts, of these basic activity changes. A summary exposition of the impact analysis design appears later in this section while a detailed presentation including the equations of the formal model appears in Appendix B.2.

The second issue to be resolved is the impact projection methodology design component of the project related to the data base available for

use in the methodology. The extensive secondary data source investigation described in Chapter IV and Appendix C was carried out primarily for the purpose of locating and evaluating data useful for impact projection. In addition, participation in design of the current Northern Cheyenne Household Survey instrument and Business Survey instrument and in design and administration of the Government Agency Survey have been undertaken for the purpose of providing data for impact analysis. The methodology presented here relies on these sources and also in 1975 Household Survey. As applied in the "first approximation" analysis, many compromises were required because survey data were not yet available.

The third issue raised involved the specification of impact projection output variables expected to be most useful to Tribal decision making. Several reports were prepared, and discussions participated in, in an effort to secure Tribal input into this decision. The last of these papers appears in Appendix B.1.

The resolutions of these three design issues resulted in the impact projection methodology design described below.

*1. Demographic Projection Methodology

Since major interest is in the Indian population, it was decided that demographic analysis should concentrate on this group. Thus,

the detailed demographic projection procedures described here were developed for projection of the Northern Cheyenne and other Indian populations by age and sex. The 1976 Tribal Census dictated areal breakdowns. For the non-Indian population, a much simpler approach was used. Namely it was assumed that, in the absence of a major development that created substantial new job opportunities, the non-Indian population in the Reservation area will remain essentially constant. Further, since there appears to be little interest in the demographic details of the non-Indian population this group is treated as a total population rather than as age and sex cohorts.

In summary form, the demographic projection component of the impact projection methodology is as follows. The population projection methodology developed and applied in this project considers all of the first two components--births and deaths--of the three-component cohort survival technique and part of the third--migration--component. The migration component is divided into two parts: non-employment related migration and employment related migration. The former is considered in this demographic projection methodology as Temporarily Present non-Residents (TPNR) and as Temporarily Absent Residents (TAR).

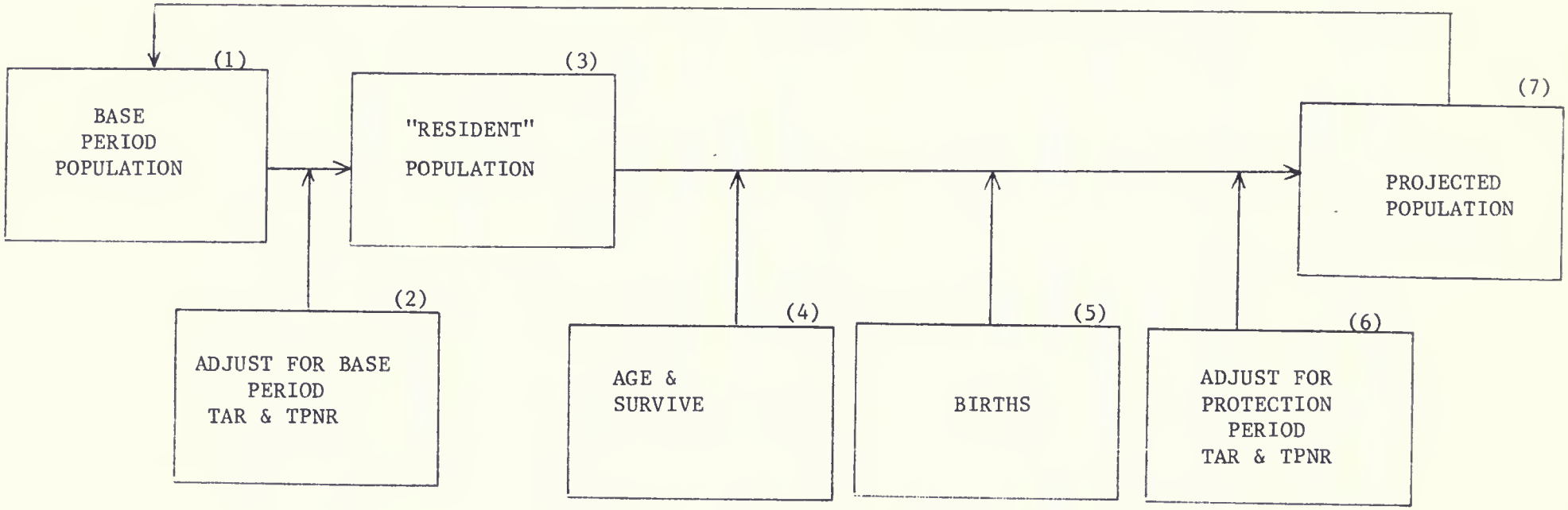
Figure III.2 describes the demographic projection technique. It should be pointed out that, unlike the economic projection routine which is discussed in the following section, this element is complete in terms of both design and calibration. The projections

Figure III.2

IMPACT PROJECTION METHODOLOGY

DEMOGRAPHIC COMPONENT

FLOWCHART



presented summarized in Chapter II and detailed in Appendix A.2. represent "final output" projections in the absence of any employment related in- or out-migration or significant additional changes in survival rates or fertility rates.

The first step, represented by Box (1), BASE PERIOD POPULATION, is to secure a reliable base period estimate of the population disaggregated by sex and five year age group. 1975 is used here as the base year. This estimate is a "census type" estimate; i.e., it includes the number of people actually living in the area at the base period regardless of whether their permanent residence is the local area or elsewhere and it excludes those not in the area even if the area is their permanent residence. The second step is to derive an estimate of the area's base period PERMANENT RESIDENT POPULATION, Box (3), by subtracting estimates of those temporarily present but not permanent residents (TPNR) and adding estimates of those who are temporarily absent but are permanent residents of the area (TAR), as indicated in Box (2) ADJUST FOR BASE PERIOD TAR & TPNR. Examples of TPNR's are residents of the Northern Cheyenne Home. Examples of TAR's are college students away from the Reservation, say at Billings, to attend college.

The resultant permanent resident population is then "aged and survived" as indicated in Box (4), AGE AND SURVIVE. This process projects the members of the base period population who are expected to survive to the projection period and advances their ages accordingly. The procedure is carried out on an age and sex specific basis which

allows population projections to depend, as they should, on initial characteristics of the population.

Next, as indicated in Box (5), BIRTHS, the number of births occurring during the projection interval is projected by applying age specific fertility rates to the average number of women in the child bearing ages (15-44) in each five year initial period age group. These births are allocated between boy and girl babies and sex specific infant survival rates are applied to produce the projected population of the youngest age group at the end of the projection interval.

This aged, survived, and birthed population projection now must be adjusted to a census type number by, in effect, reversing the TAR-TPNR adjustment of Box (2), but now with projection period estimates. This is represented by BOX (6), ADJUST FOR PROJECTION PERIOD TAR AND TPNR. Here, TAR's are subtracted from the aged, survived, and birthed population, reflecting their expected absence and TPNR's are added reflecting their expected presence. It should be pointed out that Projection Period TPNR's may represent permanent in-migration if they are for such purposes as returning to the Reservation for retirement purposes. Neither TAR nor TPNR are intended to reflect migration to or from the Reservation to look for or accept employment. This phenomenon is dealt with in the economic projection component discussed below.

The result of this final TAR-TPNR adjustment is the census-type PROJECTED POPULATION Box (7). If another five year projection is required, the Box (7) population projection enters Box (1) and the procedure is repeated to produce the next projection period's population projection. If employment related migration is projected, as discussed below, in the economic projection methodology, this migration is added to the Box (7) projection before it enters Box (1) for the next period. A formal statement of these procedures appears in Appendix B.2.

2. Economic Projection Methodology

In general terms, the economic component of the impact projection methodology design operates through a set of equations which simulate and project important characteristics of the labor market of the area and, based upon conditions in that market, project either in or out-migration of Indians and/or non-Indians in response to the presence or absence of economic opportunity in the area.

In the analysis of impacts of developments on the Indian population, it is recognized that much of this impact will take the form of changes in per capita and total personal income in the area with, possibly, little if any Indian migration in response to these changes. Further, since current per capita personal income figures for Indians on the Reservation are low relative to the nation and the surrounding area,

changes in personal income can be expected to have a significant effect on residentiary demand. Thus, personal income has been assigned a central role in the impact projection methodology design. This decision imposes a particularly heavy data collection responsibility since secondary source information, primarily that from the U. S. Bureau of Economic Analysis as discussed in Chapter IV, does not permit identification of Indian vs. non-Indian personal income characteristics. The 1975 Household Survey provides required information. It was intended that the current Survey would provide more reliable information on personal income and expenditures, but it was found during the early stages of the survey that respondants were not willing to give out detailed information about personal income and expenditures. Furthermore, the presence of such questions on the survey instrument jeopardized the rest of the survey since respondants were inclined to reject the entire survey when they found it contained questions they considered too personal. Consequently, questions about personal income and expenditures were deleted from the final form of the 1976-77 survey instrument.

Since it was not clear whether the methodology is to be implemented on a computer or to be carried out by hand, it has been decided to limit the number of economic sectors into which activity is to be disaggregated to seven. These represent a reasonable trade-off between the desire to capture relevant behavioral differences (which argues for more sectors) and the desire to keep the analysis tractable to an analyst who may be

required to carry out the calculations by hand. In the future, it may prove desirable to expand the number of sectors.

The sectors are:

1. Farming and Ranching
2. Minerals
3. Tribal Governments
4. Schools
5. Federal Government
6. Construction
7. Other Private

The remainder of this section is organized according to Figure III.3.

Box (1), PROJECTED POPULATION FROM DEMOGRAPHIC PROJECTION METHODOLOGY, represents the projected population derived from the demographic methodology described in the preceding section. Recall that this projection does not include the effects of economic opportunity induced migration and that the Indian component is projected on an age and sex specific basis while the non-Indian component is treated as a total population figure.

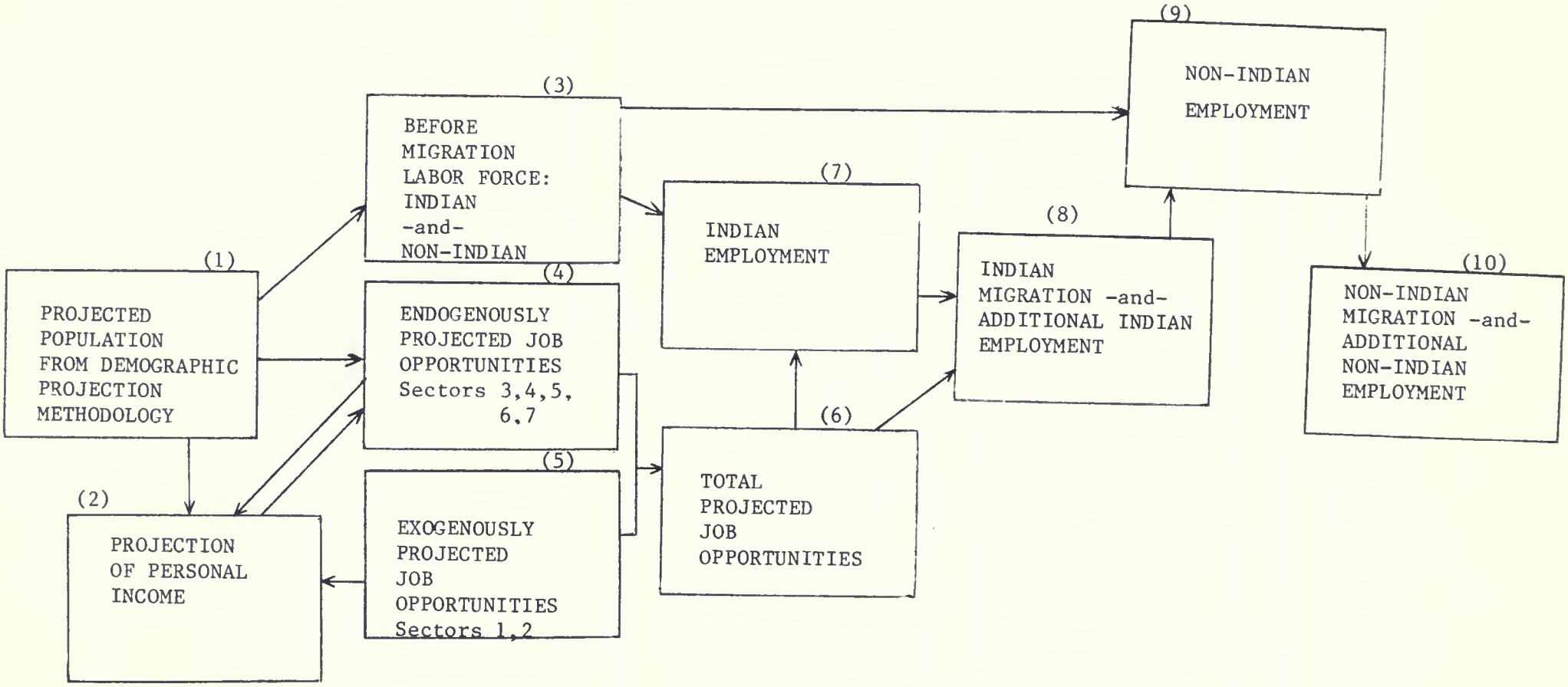
In the economic projection methodology, this population serves two purposes: (1) to provide an initial projection of the labor force and (2) to serve as the basis for projecting the residentiary component of total job opportunities. Box (3), BEFORE MIGRATION LABOR FORCE: INDIAN and NON-INDIAN, represents the first of these. According to the standard

Figure III.3

IMPACT PROJECTION METHODOLOGY

ECONOMIC COMPONENT

FLOWCHART



definition, labor force is defined as the sum of those employed and those unemployed but seeking jobs. The calculation of labor force from the Box (1) populations is achieved by the application of labor force participation rates (LFPR) to that population. The Indian labor force calculation is carried out on an age and sex specific basis while the non-Indian calculation considers only the total population. The labor force participation rate is defined as the ratio of the number in the labor force to the population. In the Indian case, LFPR's are estimated on an age and sex specific basis while the non-Indian LFPR's, again, are total population ratios. An important characteristic of the type of formulation developed here is that LFPR values used to project labor force in the future can be varied to simulate the impact of significant economic developments on willingness to actively seek employment.

For subsequent use, these labor force projections must be converted to estimates of the number of jobs the labor force would be willing to hold by adjusting for multiple job holding. This adjustment is achieved by multiplying the labor force projections by ethnic specific multiple job holding rates.

Box (2) PROJECTION OF PERSONAL INCOME, represents both an important output variable of this methodology and an important part of the residentiary job opportunity projection technique. As indicated by the many arrows into Box (2), there are many inputs into the projection of personal

income. Most of these will be discussed in the job opportunity projection discussed below. Following that, the personal income projection routine of Box (2) will be addressed explicitly. At this point, it will be worthwhile to present a brief description of the concept of personal income and of the components in terms of which it is analysed in this methodology. Conceptually, personal income is meant to include all money incomes to persons, households, or families in a given year from all sources; i.e., from wages and salaries, rents, interest payments on loans of all kinds, dividends on stocks, profits from business activities, and transfer payments from government for such programs as unemployment insurance, AFDC, etc. In the "National Income Accounting" definition, personal income does not include individual contributions to Social Security, but for present purposes this element will be included. Therefore, the following list contains the elements included in personal income as represented by Box (2):

1. gross wages and salaries by each of the sectors listed above
2. property incomes (rents, interests, profits)
3. stable transfer payments (social security, pensions)
4. variable transfer payments (AFDC, food stamps, unemployment compensation)

Items 3. and 4., which sum the total governmental transfer payments, are separated because the first, stable, part will not vary significantly with other elements of personal income, especially wages and salaries while the second, variable, part will vary inversely with other elements, especially earnings.

Boxes (4), RESIDENTIARY JOB OPPORTUNITIES, and (5) EXOGENOUSLY PROJECTED JOB OPPORTUNITIES, represent the projection of demand for local production of goods and services exerted by the population of Box (1) and by the outside world for exports, respectively. Recall that residentiary jobs are those which produce goods and services for local consumption. Export or basic employment is projected exogenously, i.e., outside the model, based upon world market conditions. These exogenously projected basic employment figures serve as input into the analysis for each alternative potential development project. A brief description of the technique for projecting job opportunities in each of the seven sectors follows:

Sector 1: Farming and Ranching

Because virtually all of the products of this sector are exported, projections of farming and ranching employment and earnings will be produced exogenously. This sector's earnings enter Box (2) as part of projected personal income. In the absence of any major expansionary development, a reasonable first approximation is to hold the projection constant at current levels.

Sector 2: Mining

Currently, no activity in this sector is underway on the Reservation. Any large scale development on the Reservation will be primarily for export and thus associated activity levels will be projected exogenously. Further, if operation of a small scale-local

consumption coal mine is undertaken, activity levels, employment and earnings, associated with it will have to be projected as part of a feasibility study and therefore exogenously. Thus, mining activity will all be projected exogenously. This sector's earnings enter Box (2) as part of personal income.

Sector 3: Tribal Government

Since this sector represents such a large portion of total and especially Indian, employment on the Reservation, and since the level of activity in this sector measured as dollars of expenditure, is itself an important projection variable in that it represents the "demand" side of Tribal revenue projection, a detailed agency by agency projection methodology has been developed. The Agency Survey, referred to earlier in this chapter, was designed to provide the data required for this methodology. The first step is to project total agency expenditures in two components: (1) that part which serves the people directly and (2) that part which serves them indirectly by providing support to other agencies. An example of directly serving expenditures would be those of the Headstart program, of indirectly serving expenditures, those of the Tribal Comptroller's office. Most agencies will be classed either as directly or indirectly serving, but some may have elements of both.

First, directly serving expenditures are calculated based upon Box (1) population. Since different agencies' programs are intended to serve different components of the total Indian population, this calculation

is centered, for each agency, on the relevant age and sex groups. The Headstart program's expenditures, for example, are projected to depend upon pre-school age population while the Law and Order program's expenditures are centered on the population as a whole. Indirectly serving expenditures are then projected as dependent upon the sum of all agencies' directly serving expenditures.

In both directly and indirectly serving expenditure categories, two further considerations are incorporated. First, it is recognized that for an agency to function, some minimal expenditure is required. This minimum for each agency is set in the projection methodology. In the absence of better information, current levels can be taken as this minimum level. Secondly, this projection methodology assumes essentially the same Tribal Government policies concerning expenditures as existed in the recent past. If these policies toward any agency change, that agency's funding level will be changed also. Thus, the ability to reflect such policy changes by exogenously varying agency expenditures in either direction is incorporated in the methodology. For several agencies, it is expected that special conditions will require the future design of special agency specific projection techniques.

From total expenditures in each agency, Tribal Governmental job opportunities and associated earnings are projected. These projected earnings enter Box (2) as part of personal income.

Sectors (4): SCHOOLS and (5) FEDERAL GOVERNMENT

Projection of expenditures, earnings, and job opportunities or employment in these sectors is carried out in the same manner as for Tribal Government with the exception that no directly vs indirectly serving breakdown is maintained--all activity in these sectors is assumed to be directly serving. Of course in the SCHOOLS sector, the population being served is the school age population.

Sector (6): CONSTRUCTION

In economic projection methodology design, the construction sector presents special analytical problems. These derive from the fact that activity in the construction sector is undertaken for the purpose of either increasing or improving a stock of buildings and other structures. Residentiary demand for such increases or improvements is complex and difficult to analyze and project. These difficulties derive from the necessity to consider such influences as the following:
1. adequacy of the existing stock of houses and other buildings in terms of both its quantity, quality, and spatial distribution;
2. related to the adequacy issue, changes in the number of families requiring housing--this presents problems even with relatively stable populations because changes in age structure can produce changes in numbers of families as the proportion of total population in the early adult age group changes; 3. the effects of changes in total and per-family personal incomes on demand for housing are pronounced in terms both of numbers of housing units required and of the quality of

housing demanded; 4. variations in availability and cost of financing; 5. changes in public sector construction of all sorts is dependent, among other things, on changes in governmental policies at all levels--these changes are impossible to project for any significant time period. These and other considerations make residentiary construction demand a much more complex phenomenon than, say, retail food stores or banking services which are viewed here as much simpler functions of income and population. Given all these difficulties, it has been decided that construction activity will be projected as two components; the first based on projected number of families as derived from the population projection represented by Box (1) and five year changes (if they represent increases) in numbers of families, the second an exogenously projected level of activity representing public sector construction and construction associated with major economic developments and resultant population and income changes. This exogenous component could, in many applications, constitute the larger portion of total projected construction sector activity. Like other sectors, construction activity will be projected in terms of earnings with employment-job opportunities derived from the earnings projection. Projected earnings, of course, enter Box (2) as part of projected personal income. It has proved infeasible due to late and incomplete survey information, during this first year's design phase, to complete specification of formal projections for this section.

Sector 7: OTHER PRIVATE

This sector includes the businesses which serve the local population, i.e., residentiary activity. As indicated above, population and personal income, and especially changes in population and personal income, are viewed as being the most significant factors in projecting activity in this sector. Before this sector's activities are projected, initial projections of personal income from all other sources, including other sectors' earnings are produced and serve as the basis for projecting earnings in sector 7. Employment and property incomes in Sector 7 are derived from these earnings projections and the income figures enter Box (2) as part of personal income.

Attention will now be turned to an explicit discussion of the personal income projections themselves. As indicated above, personal income here is broken down into component parts. Projection of the first of these, gross wages and salaries, or earnings, has been discussed as part of the job opportunities projection methodology. To recapitulate, activity in each of the seven sectors is measured and projected in terms of earnings derived from that sector. As each sector's projection is produced, it is added to already projected parts of personal income so that, when sector 7's projection is complete, total wage and salary personal income has been accumulated in Box (2). Projection of the property component of personal income should properly be projected, at least in part, as functionally dependent upon sector specific activity levels. Because of data availability limitations, this approach was not pursued here. Rather, total property income is

projected to increase in proportion to increases in earnings across all sectors. Provision is made, however, for inclusion of any marked deviation from this proportional increase projection resulting from income generated by any potential economic development.

It should be noted here that the personal income projections of Box (2) provide the mechanism through which the direct impacts of basic sector developments are incorporated into the methodology. Thus, e.g., the additional construction and mining earnings and, if any, profits to locals derived from a major coal mine would be added to a baseline projection personal income to project additional residentiary job opportunities, etc., to be expected from the coal mine if it is developed. This residentiary employment increase, population increase, etc., would be analogous to those first approximation projections produced using the simple economic base multiplier approach presented in Chapter II and Appendix A. Use of this methodology would, however, produce results more closely related to Reservation conditions and more directly relevant to the information requirements of Northern Cheyenne decision makers.

Attention will now be turned to projection of the last two parts of personal income: stable transfers and variable transfers. The stable component is not expected to be sensitive to changes in job opportunities. It is, therefore, projected as dependent upon population groups served in particular transfer payment programs; e.g., social security payments are dependent primarily on retirement age population and are so projected.

The variable component of transfer payments is expected to vary inversely with the earned income component of personal income; e.g., if total wages and salaries increased markedly, it should be expected that unemployment compensation and AFDC payments would decline as more families are able to earn adequate income in the labor market. Compilation of the 1975 Household Survey is expected to provide a data base for exact specification of this inverse relationship. Since this compilation has not been prepared as of this writing, the formal specification has not been completed and an explicit equation for this calculation is not found in the appendix.

Attention can now be returned to the job opportunity-labor supply analysis of the flowchart. Boxes (4) and (5) have discussed sector specific job opportunity projection. These are now added together in Box (6) to produce TOTAL PROJECTED JOB OPPORTUNITIES. This figure represents the total basic and residentiary jobs available on the Reservation. It remains to project how many of these are likely to be filed by Indians and how many will require drawing on a non-Indina labor force, either from nearby towns or from in-migrating non-Indians.

Box (7), INDIAN EMPLOYMENT, addresses this issue. The first step here is to allocate total job opportunities from Box (6) between demand for Indians and demand for non-Indians, regardless of the adequacy of the two races' indigenous labor forces. This allocation is to be made proportionally either by industrial sector or by occupation. A reasonable estimate of this allocation proportion could be produced from the 1976

Government Agency and Business Surveys. In many applications, this 1976 proportion will be varied to reflect such considerations as the adoption of an on-Reservation private sector Indian hiring preference policy, hiring policies negotiated as part of major economic development leasing agreements, etc.

The portion of total job opportunities allocated to Indians is next compared against Indian labor force adjusted for multiple job holding from Box (3). If adequate Indian labor is available, then these job opportunities become the Indian employment projection, otherwise Indian job opportunities which cannot be met by the indigenous Indian labor force enter Box (8) INDIAN MIGRATION -and- ADDITIONAL INDIAN EMPLOYMENT. These job opportunities serve as an attraction for the in-migration or return migration of Indians from off the Reservation. Little is presently known about how off-Reservation Indians, and especially Northern Cheyenne, might respond to such an attraction so no formal specification of such Indian migration has been developed here and no explicit equations appear in the appendix.

The last two boxes deal with projection of non-Indian employment and populations and the impacts on them of major economic developments. Job opportunities available to non-Indians are projected in Box (9), NON-INDIAN EMPLOYMENT, as the sum of the job opportunities calculated in Box (7) as not being available to the Indian labor force and those jobs which were projected as available to Indians but for which

insufficient Indian labor force exists even after whatever Indian in-migration is projected to occur is accounted for. If sufficient non-Indian labor force to fill these jobs is projected in Box (3), then these job opportunities become non-Indian employment. Otherwise, excess job opportunities enter Box (10), NON-INDIAN MIGRATION -and- ADDITIONAL NON-INDIAN EMPLOYMENT. It is presumed that sufficient non-Indian in-migration will occur to take all available jobs and, of course, to take all additional residentiary jobs created by this in-migration.

This, then, completes the calculation routine for the first projection period. The resultant population, which consists of the Box (1) demographic population increase projection plus Indian and non-Indian in-migration projections if any, of Boxes (8) and (10), respectively, then serve as the basis of the next projection period and the entire demographic and economic projection procedures are repeated.

A detailed technical statement of this procedure appears in Appendix B.2.

*E. MANPOWER

The question of manpower requirements for the economics portion of the proposed information system has been the subject of substantial consideration. These considerations lead to a memo, appearing as

Appendix B.3., describing the skills and abilities required in such an employee in the context of a staff economist for the NCRP. It is expected that this person could manage the information system with assistance from other NCRP staff professionals and one or two clerical assistants.

F. CONCLUDING STATEMENT

This chapter has attempted to outline the general requirements of a decision information system in the context of overall governmental policy and decision making and planning and to set out the design of a decision information system which would meet the needs of the Northern Cheyenne Tribe. This system includes both an information acquisition, handling, and dissemination system component and the economic and demographic parts of an analytical component. This design is viewed as the central element of work done in this project. If the Tribe decides that this design holds promise of meeting their needs, funding for a year long project to fully implement this system could be sought and the system implemented at the NCRP.

CHAPTER IV

DATA DEVELOPMENT AND INFORMATION SOURCES

As indicated in the first chapter of this volume, this chapter is presented as an "information about information" chapter. Thus, while much of the data summarized here is of current interest in and of itself and has been used in the analytical work appearing in Chapter II and the examples in Appendix B, the primary purpose of this chapter is to present the Tribe and the NCRP with an extensive listing of the sources of data discovered in the course of the project, a brief description and evaluation of the information available from each, and, where possible, an identification of persons who can be contacted for further information, data updates, etc. Such information about information and its sources is a vital part of a decision information system as outlined in Chapter III.

Because of the purpose of this chapter, no effort has been made here to discuss the uses to which each type of data discussed has been or could be put. Such issues are addressed in previous chapters.

Since this chapter is presented as an information about information and information sources discussion, it is, frankly, rather dry. Thus, the general reader may prefer to skip the chapter while the reader whose interest lies in establishing for himself a set of sources for

information may wish to read the chapter in its entirety. Still other readers may be concerned with specialized types of data or with specific sources; such a reader would be best served by selecting those sections which relate to his specific needs.

This chapter is divided into three sections; the first dealing with primary data, the second dealing with data collected from secondary sources, and the third with a concluding statement. The primary data section discusses the three surveys (public agency, business, and household) conducted by the Northern Cheyenne Research Project (NCRP). The secondary data section discusses the data collected from secondary sources and evaluation of that data.

The primary data section explains the purpose of the surveys, the process of development and implementation, and problems which developed with the surveys. The secondary data section presents a detailed description of each data set, and a summary presentation of the data found in the data set. For each data set, the person or agency which provided the data will be identified to support further data collection efforts in the future. In addition to this information for each data set, problems of confidentiality will be noted and explained. For the cases where this occurs, a person or an agency will be noted from whom permission should be sought before release of the information or before access to the information will be granted.

A. PRIMARY DATA

Primary data is information which is developed from original investigation and research. For this project, only secondary data was to be collected and evaluated for economic impact and feasibility analyses by Rho. However, as time progressed and secondary data sources were found to be inadequate, the need for primary data became apparent. The socio-cultural division of the NCRP was under contract from the Old West Regional Commission to conduct three surveys: a business survey, a public agency survey, and a household survey. Rho prepared the survey instrument for the public agency survey, and took responsibility for the initial mail-out to the various tribal and federal programs and to the schools. The three surveys carried out under the Old West grant provide the necessary data base for carrying out socio-economic impact and feasibility analyses on the Reservation.

In order to aid in the economic impact and feasibility analyses for this year's project, the information from these surveys was needed by January 1, 1977. However, due to apparent time constraints, none of the surveys were completed by that deadline. However, the results of all the surveys should be compiled and tabulated by the end of the project, and should provide the data base necessary to conduct future socio-economic analyses on the Northern Cheyenne Reservation.

1. Public Agency Survey

The public agency survey was developed by Rho and the NCRP staff. The survey was designed to collect the following information: age, sex, occupation, wage, and ethnic identity (Cheyenne, other Indian, and non-Indian) of the employees of each agency; information about the seasonality of employment; and information about current and anticipated future funding levels. The survey instruments were mailed to approximately 50 public agencies on the Reservation on December 3, 1976. Members of the NCRP staff in Lame Deer followed up on these surveys and aided the agencies in filling out the instrument when difficulties were discovered. The completed forms were mailed to the NCRP office in Lame Deer and checked for errors in the filling out of the instrument. The completed survey instruments were coded by NCRP staff, and the task of tabulation was divided between NCRP and Rho. Tabulation and analysis took longer than anticipated and therefore it was not possible to incorporate the results in this year's economic impact and feasibility analyses by Rho. The use of information from this survey in Reservation economic impact projection is discussed in Chapter III and illustrated in Appendix B.

2. Business Survey

A survey of the approximately 40 private businesses on or near the Reservation was conducted by the socio-cultural division of the NCRP. This survey instrument was developed by the NCRP staff, with assistance from Rho, Community Development Corporation, and others. The survey was

conducted in February, 1977, by Suzanne Trusler, economic consultant to NCRP. The survey gathered information from businesses on and adjacent to the reservation to inform the Tribe what businesses are operating on and around the Reservation, who owns them (Cheyennes or non-Cheyennes), how many persons are employed in them (Cheyennes or non-Cheyennes) and how much money is flowing into and out of the Reservation through these businesses. Unfortunately, the business survey results were not obtained in time to incorporate them into the analyses being prepared by Rho.

3. Household Survey

A household survey of the Northern Cheyenne Reservation was conducted in 1975 by the NCRP. However, the results of this survey were in a form which could not be used for this year's economic impact and feasibility analyses. Two options presented themselves. One, the old survey could be recoded so that the results could be used or two, a new household survey could be initiated. It was determined by the NCRP staff that both options would be followed. Recoding plans for the 1975 survey and design of the new survey instrument were undertaken by the NCRP staff with assistance from Rho and Tribal Agencies. However, both the recoding effort and the development and implementation of the second household survey took longer than expected and the results were not able to be incorporated in this year's economic impact and feasibility analyses.

As stated before, the results from these three surveys were not used in this year's economic impact and feasibility analyses due to the late completion date of the surveys. However, the data series developed from this information could be of invaluable aid to future economic, as well as sociological and cultural, analyses. It is expected to serve as the calibration data base for the impact projection methodology discussed in Chapter III and Appendix B.

B. SECONDARY DATA

Secondary data is information which is received or collected from a source which has performed the primary investigation or has accumulated data in pursuance of other missions, such as carrying out governmental programs. Most data collected in conjunction with this project is secondary data. After collection, the data must be evaluated for reliability and usefulness to the economic impact and feasibility analyses. The following section deals with and evaluates all of the secondary data collected by Rho.

For most of the data sets covered in this section the following information will be presented: the source from which the data was collected; the form (or media) of the data; whom to contact for further information on the data set; the update schedule; an evaluation, including problems encountered, of the data set; the level of detail available for each data set; and a summary of the data. When the data set discussed has a confidentiality problem, the person or agency responsible for approval of access will be identified.

The exception of the format presented above is the first data set discussed, the 1970 Census of Population information. This data set is so large and varied in its data elements, that it will be given special treatment.

1. 1970 Census of Population by the Bureau of Census

In 1970 the regular decennial national census was undertaken by the Bureau of the Census. The information collected from this census has been a major data base for all socio-economic research groups. Information from the census is available in two forms, computer tape and publications. The computer tapes contain information in a more highly detailed form than that which is available in the Census publications.

For this project, the Montana Department of Community Affairs prepared and sent Rho tape copies of three tapes provided by the Bureau of Census. These tapes are copies of the Second Count Census tape, the Fourth Count Census Population tape, and the Fourth Count Census Housing tape for seven counties in Montana (Bighorn, Carbon, Powder River, Rosebud, Stillwater, Treasure, and Yellowstone). Each of these tapes will be discussed individually.

The tapes received from the Montana Department of Community Affairs have been translated for use on the University of Utah Computer Center Univac 1108 Computer by Rho personnel, but, due to

their number, tables for each data element have not been produced. However, a discussion of the information available on these tapes is necessary as a reference to a data source which may be more fully utilized in the future. The economic impact and feasibility analyses utilize information from census publications; especially the 1970 Bureau of the Census Subject Report -- American Indians PC(2)-1F, which is detailed later in the section.

*a. 1970 Second-Count Summary Tape-File B

The second-count tape varies from the fourth-count tape in the level of detail presented. There are four major counts released by The Bureau of the Census. Each count is prepared separately and released in numerical order. Each count is more detailed in its information than the count previously prepared.

The second-count summary tape (file B) contains records for each census county division (CCD). The census county divisions are sub-county geographical breakdowns established by the Bureau of Census. A list of the census county divisions associated with each county is presented in Table IV.1. A list of the table of contents for the second-count summary tape appears in Appendix C.1. The second-count tapes contain aggregated information about the population of the area and the housing characteristics of the population. There are 93 tabulations appearing on the second-count tape for each CCD.

Table IV.1

Census County & CCD Names and Numbers

State of Montana

County		CCD	
Name	Number	Number	Name
Bighorn	106003	003005	Busby-Decker
		003010	Hardin
		003015	Lodgegrass-St. Xavier
		003020	Pryor-Beauvais Creek
		003025	Sarpy
Carbon	106009	009005	Five Mile Creek
		009010	Fromberg-Bridger
		009015	Joliet
		009020	Luther-Bear Creek
		009025	Redlodge
		009030	Roberts
		009035	Warren
Powder River	104075	075005	Broadus
		075010	East Powder River
		075015	Otter
		075020	Stacy
Rosebud	104087	087005	Ashland-Lame Deer-Birney
		087010	Colstrip
		087015	Forsyth
		087020	Rosebud-Angela
		087025	Samatra-Ingomar-Vananda
Stillwater	106095	095005	Absarokee
		095010	Columbus
		095015	Columbus North
		095020	Columbus South
		095025	Park City
Treasure	104103	103010	North Treasure
		103015	South Treasure
Yellowstone	106111	111005	Billings
		111015	Billings West
		111020	Buffalo Creek
		111025	Huntly Project
		111030	Laurel
		111035	Laurel Rural
		111045	Molt-Broadview
		111050	Shepherd
		111055	South Yellowstone

*b. 1970 Fourth-Count Summary Tape (Population) -- File B

This tape is more detailed in its population characteristics information than the second-count summary tape. There are 127 tabulations of population characteristics about each CCD appearing on the tape. A list of the table of contents for the fourth-count summary tape (population) appears in Appendix C.2.

*c. 1970 Fourth-Count Summary Tape (Housing)-- File B

This tape is more detailed in its housing characteristics information than the second-count summary tape. There are 200 tabulations of housing characteristics for each CCD appearing on the tape. A list of the table of contents for the fourth-count summary tape (housing) appears in Appendix C.3.

The information from these census tapes and the census publications, although helpful in economic impact and feasibility analyses, is becoming outdated. The 1970 census also appears to significantly undercount the number of Indians in Montana. Another problem with most of the Census data is the racial breakdown of the numbers. Separate categories exist for Negro and Hispanic, but not, in nearly all categories, for Indians. This renders the usefulness of this information very limited in the sense of the present project.

2. Demographic Data

Appendix A.2. details much of the demographic data collected and discusses the uses to which it was put, especially in preparation of population projections.

a. Population

*i. 1976 Tribal Census

In Summer/Fall, 1976 the Northern Cheyenne Research Project conducted a Tribal Census under the direction of the Tribal Council. The original files, census forms for each place of residence, are located in the NCRP office in Lame Deer, Montana. Tabulations of these files were provided to Rho. Jean Nordstrom in the NCRP office is the person to be contacted for further information on this data set. At the present time, no update schedule has been determined.

Although this data set does seem to be the most reliable source of information of the Northern Cheyenne Reservation population, some problems do exist. Due to the fact that the census was conducted over a period of months, it is not consistent from area to area. For example, Mission Grounds was censused before the school year began so many of the boarders at the Labre School were not counted. However, Busby was censused during the school year, so boarders at the Busby School were counted. In addition, only Northern Cheyenne Indians were

censused in off-Reservation Ashland--another consistency problem. An off-Reservation survey of the Northern Cheyenne at known addresses was conducted. However, the results of the off-Reservation survey were obtained at to late a date to aid in the economic impact and feasibility analyses.

This data set provides the following detail for all people at and temporarily absent from each place of residence on the Reservation and for the Northern Cheyenne residents of Mission Grounds and Ashland: legal name of individual; any other name used (including maiden name); sex; date of birth; age; tribe of enrollment; and mailing address. The number of families living at each residence is also included.

Table IV.2
Data Summary of 1976 Tribal Census

	Male	Female	Total
Enrolled Northern Cheyenne on Reservation	1,196	1,198	2,394
Unenrolled Northern Cheyenne on Reservation	53	59	112
Other Indians on Reservation	184	149	333
Non-Indians on Reservation	205	183	388
Total Northern Cheyenne Reservation Population	1,638	1,589	3,227

This data set in its original form is considered extremely confidential. As noted before, and as is proper, only tabulations from the original files were provided to Rho. The approval of the

Northern Cheyenne Tribe should be sought before releases of any specific elements of this data set.

ii. 1970 Bureau of the Census Subject Report--American Indians PC(2)-1F

The Bureau of the Census developed a subject report (PC(2)-1F) on American Indians from its information on the 1970 Census of Population. The update schedule for this report should be 10 years to coincide with the 1980 Census of Population. Although this document contains a great amount of information, only the population tabulations were utilized for this study. The 1970 population of the Northern Cheyenne Reservation was 2,357 (1102 males and 1255 females). It is believed that undercounting of the Indian population occurred, not only on the Northern Cheyenne Reservation, but for all of Montana's reservations. Due to this undercount, vital rate calculations using this data set could be suspect. For the Northern Cheyenne Reservation (for all Indians, not just the Northern Cheyennes) the following level of detail exists in this data set: five year age and sex groups; marital status; years of school completed; employment by nine broad sectors; relationship to head of household; families by presence of children; children ever born; place of birth; and school enrollment for all Indians. Some information on Northern and Southern Cheyenne together is available in this publication, but not for Northern or Southern Cheyennes separately.

Published census data concerning the Northern Cheyenne Reservation appears as Appendix C.4.

b. Vital Statistics

i. 1973 & 1974 Births and Age of Mother by Service Unit

This data set, which is updated yearly, is provided by the Billings Area Indian Health Service. Harvey Lich of the Billings office is the person to contact for further information on this data set. The following level of detail exists for the years 1973 and 1974 for six service units: Blackfeet, Crow-Northern Cheyenne, Flathead, Fort Belknap, Fort Peck, and Windriver; number of Indian births to mothers ages -15, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45+.

Table IV.3
Data Summary for Total Indian Births

	1973	1974
Northern Cheyenne-Crow Service Unit	243	271
Total Area (Montana & Wyoming)	992	917

The numbers do not correspond to some other birth data received and there is no sex of child given.

ii. 1973 Births and Percent Distribution by Age of Mother by Service Unit

This data set is also from the Billings Area Indian Health

Service (IHS) Office. The document given to Rho was compiled from computer cards, which were duplicates of birth certificates, and was in very aggregated form. Although the cards exist for the years 1959-1975, due to lack of time and funds only 1973's records had been compiled. This data set did not include sex of child information. The following level of detail is available for each of the six service units, Blackfeet, Flathead, Crow-Northern Cheyenne, Rocky Boy, Fort Belknap, and Fort Peck; number of births to Indian mothers ages -15, 15-17, 18-19, 20-34, 35-44, 45+. It also lists births by county of residence and age of mother.

Table IV.4
Data Summary for Total Indian Births

	1973
Crow-Northern Cheyenne Agency	254
Total Area (Montana)	892

Although the tabulations provided to Rho were not confidential, the original files, the computer cards, are highly confidential. Access to them would require permission from Director of the Montana State Board of Health and Director of the Indian Health Service.

*iii. 1969-1971 Montana Resident Births by Age of Mother, Race and Sex of the Child

The Montana Department of Community Affairs in Helena, Montana, has provided Rho with counts of births of Montana Indians by age of

mother, race and sex of child for the years 1969, 1970, and 1971. As discussed in Appendix A.2., it appears that these records overcount Montana Indian births. The probable explanation is that mothers from out of state come to Montana to have children. Harvey Lich of the Billings Area Indian Health Service Office supports this theory. The data is very useful in determining the fertility rates used in population projections. However, the overcount of this data set and the undercount of the 1970 Census of Population produces a first estimate of fertility rates for the age group 15-29 to be abnormally high. As discussed in Appendix A.2., adjustment to these estimates were made before they were used in population projection work. According to this data set there were a total of 1,553 male Indian births and 1,453 female Indian births in Montana for the years 1969, 1970, and 1971.

iv. 1970 - 1975 Live Births to Indian Residents

This data set was provided by John Wilson of the Department of Health and Environmental Sciences, Bureau of Records and Statistics in Helena, Montana. The data set is updated yearly with the information being retained by the State Board of Health. For this data set the following level of detail is available: male and female Indian births by county of residence for the years 1970-1975; the number of twins, triplets and illegitimate births by county of residence; the number of

total and illegitimate births by single year of age of mother; and total births by month of occurrence for the State of Montana.

Table IV.5
Data Summary of Total Montana Indian Births

1970	1971	1972	1973	1974	1975
1,007	1,069	1,017	1,065	1,030	1,144

*v. 1969-1971 Montana Resident Deaths by Single Year of Age, Race, and Sex

This data set was collected from the Montana Department of Community Affairs. Five year survival rates (the probability that a person living at the beginning of a five year period will still be alive at the end of the period) produced for Indians from this data generally resemble survival rates that are expected as normal for Western United States Indians. However, when combined with the 1970 Census of Montana Indians, some of the derived survival rates were abnormally low, possibly due to the small number of events in the tabulation. Also, for Indian males the table shows a peculiar 21 year cycle of abnormally high deaths at ages 0, 21, 42, and 63. No reasonable explanation for this phenomenon has been found. The total Indian deaths for this time period (1969-1971) was 843 (481 males and 362 females). The level of detail available in this data set is number of deaths by race (including Indian), by sex and by single year of age up to 84, and 85+. This item is discussed in Appendix A.2.

vi. 1969-1975 Montana Deaths of Indian Residents

This information was collected from John Wilson of the Department of Health and Environmental Sciences, Bureau of Records and Statistics. It is updated on a yearly basis. The data set gives the number of male and female Indian deaths by marital status (single, married, widowed, and divorced), county and for the state by month of occurrence.

Table IV.6
Data Summary for Total Montana Indian Deaths

1969	1970	1971	1972	1973	1974	1975
249	290	304	278	303	281	259

vii. 1970-1974 Indian Vital Statistics by County of Residence

This data set was provided by Harvey Lich of the Billings Area Indian Health Service Office. It includes information about Montana and Wyoming counties. The data set is too aggregated for detailed use in the economic impact and feasibility analyses. Births and deaths are not sex specific and the births are not specific to the age of mother. The following information is available from this data set: Number of Indian births by births in hospital, births without physician, births by midwife, and other births, and Indian deaths by county. Also included in this information for the Crow-Northern Cheyenne Service Unit are deaths by specific cause of death (infective and

parasitic disease, drowning, etc.) and by age group (age 0-1, five year age groups to 80-84, then 85+).

Table IV.7
Summary of Indian Vital Statistics

Indian Births for:	1970	1971	1972	1973	1974
Montana	1,007	1,051	1,017	1,065	1,030
Wyoming	200	151	155	169	181
Indian Deaths for:					
Montana	290	296	287	303	283
Wyoming	31	34	48	54	56

*c. Military Enlistments

Estimates of Northern Cheyenne Tribal members in each branch of the armed forces were provided by the recruiters in Billings, Montana, for each of the various military services. This information was obtained through telephone conversations with recruiters. It must be emphasized that these are just estimates due to the time it would take each recruiter to search through the enlistment files. Therefore, the reliability of these numbers is questionable. These items are discussed in Appendix A.2.

Table IV.8
Cheyenne Military Enlistments

United States Army

Northern Cheyenne in the Army 12 males

United States Navy

Northern Cheyenne in Navy	1 male

United States Marine Corps

Northern Cheyenne in the Marine Corps	3 males

d. Resident Population Adjustments

Northern Cheyenne Home

The Northern Cheyenne Home in Ashland serves as a boarding home for some students at the Labre School and for other Indians. These records were derived from phone conversations with Jean Nordstrom and from the school enrollment records of the Labre School. The breakdown for this information is by age, sex, and tribal affiliation.

Table IV.9
Northern Cheyenne Home Residents

Northern Cheyenne Residents	37
Other Indian Residents	12

This item is discussed in Appendix A.2.

e. Education

*i. Primary and Secondary

All the school enrollment records for the primary and secondary groups were provided by Eugene Fisher of the Career Development Program Office in Lame Deer, Montana. They are derived from the enrollment information provided to Mr. Fisher from the schools. The information for each school contains the following detail for children attending the school during school year 1976-1977: name; date of birth; parent or guardian; home address; tribal affiliation; percent of Indian blood; grade and I.D. number.

This information is confidential due to the inclusion of names of individuals. The approval of the Northern Cheyenne Tribe and the Director of each school should be sought for access to any detailed information. These items are discussed in Appendix A.2.

Table IV.10
Primary and Secondary School Enrollment

Lame Deer Grade School Enrollment	
Northern Cheyenne Enrollment	341
Other Indian Enrollment	5
Busby Grade School Enrollment	
Northern Cheyenne Enrollment	166
Other Indian Enrollment	24
Labre Grade School Enrollment	
Northern Cheyenne Enrollment	195
Other Indian Enrollment	45

Busby High School Enrollment

Northern Cheyenne Enrollment	61
Other Indian Enrollment	17

Labre High School Enrollment

Northern Cheyenne Enrollment	105
Other Indian Enrollment	54

Big Bend School Enrollment

Northern Cheyenne Enrollment	7
Other Indian Enrollment	0

Colstrip Grade School Enrollment

Northern Cheyenne Enrollment	21
Other Indian Enrollment	24

*ii. Higher Education

This information was provided by Jean Nordstrom of the NCRP office after collaboration with Sam Big Foot of the Career Development Program office. These records list the students by single year

of age, sex, whether counted in 1976 Tribal Census, and number of dependents (spouse and children). These are very reliable numbers for the students. However, there is no age or sex breakdown for dependents. The total count of students is 142. The total count of dependents is 155. This item is discussed in Appendix B.2.

3. Economic Data

a. Employment

*i. Bureau of Economic Analysis Employment 1970-1974

This data set was collected from the Montana Department of Community Affairs in Helena, Montana. It is in two forms, tape and documents. The tape which was provided to Rho has been translated. However, tables from the tape have not been produced. Therefore, only the documents will be reviewed here. The data presented on the documents is in very aggregated form, especially in geographic terms (only county information), which renders its aid in detailed impact and feasibility analyses somewhat limited. Another problem with this data is that it uses only covered employment for its industry employment and that no detail in industrial sectors for proprietors exist. Another problem is that disclosure problems prohibit the release of employment data in some broad industrial sectors. The following level of detail is presented for seven counties (Big Horn, Carbon, Rosebud,

Stillwater, Powder River, Treasure, and Yellowstone): employment by eight industry sectors, three government sectors, farm, farm proprietors and non-farm proprietors. A detailed listing for Rosebud and Big Horn Counties appears in Appendix C.5.

Table IV.11
Summary of BEA Employment Data

County	1970	1971	1972	1973	1974
Big Horn	3,870	3,921	3,750	3,800	4,047
Carbon	2,943	3,000	3,015	3,084	3,085
Powder River	1,242	1,240	1,235	1,194	1,249
Rosebud	2,546	2,792	2,984	3,227	3,511
Stillwater	1,767	1,825	1,855	1,863	1,923
Treasure	480	480	484	499	498
Yellowstone	37,096	38,461	40,357	42,949	44,981

ii. 1965, 1970, 1972, 1974, 1975, 1976 Montana Employment Security 202 Records

The 202 records for the State of Montana and each county of the State list employment and earnings by SIC (Standard Industrial Classification) Codes. Those codes have four digit detail. The first digit gives the broad industrial sector classification in terms of the primary product produced by firms in each sector. The second, third, and fourth digit then present greater and greater detail until the four digit breakdown presents the greatest detail

available. In Montana some of the counties have so few firms that this four digit detail could identify any individual firm. It is because of this possible identification of an individual firm that a disclosure problem exists under the Social Security Act.

With the aid of Dick Gibson and his staff in the Research and Analysis Division of the Montana Department of Employment Security, Rho was able to aggregate these employment records to, in most cases, the two digit level to avoid disclosure problems. For Powder River County it was necessary to aggregate to the one digit level to avoid disclosure problems. The employment records are gathered on a quarterly basis and therefore, the figures in the data summary represent annual average total number of employees covered by unemployment insurance, i.e., covered employment.

Several problems with this data exist. First, only covered employment is listed and therefore, farm workers, proprietors, and some governmental employees are not included since they are not covered under unemployment insurance. Government employees were covered starting in July, 1975 and were included from that point on. Second, there is no geographical unit smaller than county presented. Third, there is no ethnic specificity in the employment records. Because of the second and third problems, it is especially difficult to relate this information to the Northern Cheyenne Reservation.

The following level of detail does appear in these employment records: for the counties, employment and earnings records were

by one digit detail with some two digit detail in the trade and service sectors; and for the state, two digit detail was collected. The number of firms in each sector is also available.

Table IV.12
Montana Department of Employment Security
Annual Average Total Covered Employment

Year	Rosebud	Big Horn	Powder River	Montana
1965	655	1,292	149	
1970	693	1,105	418	138,345
1972	987	1,276	381	
1974	1,466	1,460	418	
1975	2,622	1,869	322	189,944
1976 (1st Quarter)	2,812	2,264	407	

iii. Career Development Program Employment Reports

In 1975 the Career Development Program office in Lame Deer, Montana, undertook the job of producing the BIA Labor Force Annual Report. To aid in the completion of these reports, the Career Development Program office sent letters requesting employment and earnings information to most of the employers on or adjacent to the Reservation. Rho obtained only a small portion of the total response.

For the data collected, the quality is relatively good. However, due to inconsistencies in filling out each request, it is difficult to get a complete list of employment.

Each response to Career Development's request for Indian Employment at each government agency or private business includes the following level of detail: employee's name, salary, position, and type of work (permanent or temporary). On some responses only name and type of work appears. The total employment reported on these sheets for the year 1975 was 426.

iv. Indian Health Service (IHS) Employment Records 1976

Nancy Owens of the NCRP office provided Rho with a copy of a compilation of employment at the IHS office in Lame Deer, Montana, which was given to her by Russ Miller, director of the local IHS office. For each of the 38 employees, name, title, and grade are listed. There is no age or ethnic breakdowns in the listing. This makes this employment information difficult to use for the purpose of determining Northern Cheyenne employment.

v. Bureau of Indian Affairs (BIA) Employment Records - 1976

Dan Harwood, acting Superintendent of the local BIA office in Lame Deer, provided Rho with copies of his office's 1976 total employment records. They list title, grade, race, and sex for each employee for November, 1976. However, there is no age breakdown for all employees or Tribal affiliation in the Indian race breakdown.

Table IV.13
Summary of BIA Employment for 1976

Total Employees 53

Indian Employees 49

vi. Big Horn County Employment Records - 1976

The Big Horn County Clerk's office in Hardin, Montana, provided Rho with a list of county employees for the year 1976. There is no ethnic specificity, age specificity or worksite information on this list. The list presents the following level of detail: title, sex, and salary for each position. There were 90 total county employees in 1976.

vii. Rosebud County Employment Records - 1976

The Rosebud County Clerk's office in Forsyth, Montana, provided Rho with a list of county employees for the year 1976. There is no ethnic or age specificity or work site information on the list. The list presents the following level of detail: name, title, and salary for each employee. There was a total of 50 county employees in 1976.

*b. Earnings--1970-1974 Bureau of Economic Analysis Earnings Records

This data series, as was the case with BEA Employment Records, was provided by the Montana Department of Community Affairs in two

forms, computer tape and documents. The computer tape which was provided to Rho has been translated. However, tables from this tape have not been produced. Therefore, only the document will be reviewed here. This information is very aggregated, as was the case with the employment records, and is subject to similar problems. Disclosure problems prohibit the release of earnings data in some industrial sectors. Geographic or industrial detail is not provided so that the use of this data set is limited for the economic impact and feasibility analyses for the Northern Cheyenne Reservation.

The following level of detail exists for this data series: total labor and proprietors income at place of work by type (wage and salary, other labor income, proprietors income by farm and non-farm). Total labor and proprietors income at place of work is also listed by industry in non-farm and farm categories. The non-farm category has eleven industry sectors listed. Derivation of personal income for place of residence detail is listed as follows: labor and proprietor's income by place of work, residence adjustment, net labor and proprietor's income by place of residence, dividends, interest, rent, transfer payments, personal income by place of residence, population, and per capita income. The information exists for seven counties (Big Horn, Carbon, Powder River, Rosebud, Stillwater, Treasure, and Yellowstone). A detailed listing for Rosebud and Big Horn Counties appearsin Appendix C. 6.

Table IV.14
Summary of BEA Earnings Data

Personal Income by Place of Residence (in thousands of current dollars)

Counties	1970	1971	1972	1973	1974
Big Horn	$31,657	$29,806	$35,670	$38,512	$37,131
Carbon	24,709	25,974	30,803	35,382	34,415
Powder River	8,599	8,811	11,876	11,366	12,026
Rosebud	19,806	21,123	24,545	29,397	29,978
Stillwater	16,097	17,558	21,139	24,372	22,341
Treasure	4,699	5,167	5,721	6,779	5,460
Yellowstone	329,368	359,267	402,292	453,122	501,855

c. Labor Force 1974 & 1976 Bureau of Indian Affairs Labor Force Reports

For the Northern Cheyenne Reservation the Bureau of Indian Affairs produces a labor force report annually. Copies for years 1975 and 1976 were provided by the Career Development Program office in Lame Deer, Montana. This report includes the following level of detail: resident Indian population on or adjacent to the Reservation by sex; resident Indian population of working age by age groups (16-24, 25-34, 35-44, 45-64, 65+) and by sex; the count of those not in the labor force due to school attendance, disability, or retired, by sex; potential labor force by sex; total employed by sex; total not employed by sex; and those actively seeking work by sex.

Problems associated with this data set include inconsistencies concerning the determination of the labor force and employment. This is due to the fact that the Bureau of Indian Affairs produced the report until mid-year 1975. Then the Career Development Program office undertook the program and different techniques were used to determine labor force and employment. However, this is the only real source for the determination of labor force participation rates on the Reservation.

Table IV.15
Summary of BIA Labor Force Reports

	March, 1974 Report for 1973	April, 1976 Report for 1975
Total Resident Population	3,043	3,162
Total Working Age Population	1,719	1,780
Potential Labor Force	1,184	1,315
Total Employed	795	747

d. Housing

The only housing information collected to date is that included in the 1970 Census tapes and publications, in particular, the 1970 Census Second Count and Fourth Count Housing tapes and related documents. Possible sources of this information for future socio-economic analysis would include the 1975 and 1976 Household Surveys and NCRP Land Use Division work.

*e. County Profiles

The County Profiles were developed by the Montana Department of Community Affairs, Division of Research and Information Systems, in Helena, Montana. A profile has been produced for each county of the state. Doris Neu in the Helena office is the person to be contacted for further information on this data series. The information is presented in ten sections (population, employment, personal income, housing, education, health and vital statistics, agriculture, land and water use, revenue, and social welfare statistics). The county profiles for Rosebud and Big Horn Counties appear in Appendix C. 7. Most of the data in the county profiles are reproductions of data from the 1960 and 1970 Census of Population and the Bureau of Economic Analysis Employment and Earnings Information.

C. CONCLUDING STATEMENT

The data sets which were utilized in this year's economic impact and feasibility analyses proved to be very limited at times. The demographic information (population, vital statistics, non-employment related migration, and school enrollments) was relatively adequate. The economic information (employment, income, and labor force) and the housing information were very limited. The availability of detailed employment records, income records, housing characteristics,

and Tribal revenue and expenditures is a necessity to the accomplishment of detailed socio-economic analyses. It is hoped that the data series which could be developed from the three surveys will be used to update the present information and provide a basis for future and more detailed socio-economic analyses.

As indicated earlier, this chapter is dry and rather tiresome reading for most of those who will read this report. Again, the purpose is to present a discussion of information available from various sources. Such an effort is essential to the creation of a decision information system. An important part of the job of the staff of such a system would be the maintenance, expansion, and updating of the information about information and its sources found in this chapter. As indicated throughout the text, still more detailed discussions are to be found in indicated appendices. Readers with specific interests in specific areas are encouraged to pursue the appendices which are relevant to their needs.

APPENDIX A

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Appendix A.1.

Preliminary List of Potential Economic Development Projects

Discussion Paper

Refers to: Chapter II.A.

PRELIMINARY LIST OF POTENTIAL ECONOMIC DEVELOPMENT PROJECTS

DISCUSSION PAPER

October, 1976

Prepared for The Northern Cheyenne Research Project

by Rho Corporation

This paper is presented for the purposes of bringing out discussion of the many potential economic development options available to the Northern Cheyenne and as a result of these discussions of selecting a small number of these developments for analysis as to (1) their feasibility for development on or near the Northern Cheyenne Reservation and (2) their impact upon the population and economy of the area.

The objectives of the two types of analysis to be carried out are as follows. Feasibility analysis is to determine whether the potential developments are actually capable of being operated profitably and therefore whether the Tribe should spend more time and money in analysing the implications of the development for its people and economy (impact analysis) and in either trying to promote the development if it is desired or block it if it is not desired and in preparing to respond to the impacts of the development if it occurs. The question addressed in feasibility analysis is simply whether the development will bring in enough revenue to cover its cost and have some left over for profit if it is a private undertaking or to provide revenue to the Tribal government if it is a Tribal government enterprise.

Impact analysis is broader in scope than is feasibility analysis. The purpose of impact analysis is to tell the Tribe what changes in the area the Tribe lives in will result from the development if it occurs. These impacts are of several types: (1) economic, (2) socio-cultural, and (3) environmental.

It is intended that the NCRP will be able to provide research in all these areas. A companion discussion document, titled, "Suggested Impact Analysis Information Types: Discussion Paper," presents the types of information to be presented in impact analysis--such as numbers of people in the area by race, age, sex; number of housing units needed; numbers and kinds of jobs; Tribal revenues, etc. That paper, like this one, is intended to stimulate discussion and to secure Tribal inputs so that the information presented will be as useful as possible to the Northern Cheyenne people and their Tribal government.

Several ideas must be kept in mind in considering the list of potential developments presented here:

1. The presentation of these developments for discussion does not indicate any commitment to actually carrying out the development. Further selection of developments for analysis also does not indicate a desire to carry out the developments. Rather, the purpose of the list is to select those developments which the Tribe wishes to have analysed as to their feasibility and impact. Interest in these developments may derive from either a desire to see the development undertaken, or a desire to show the undesirable effects of the development in order to block it, or, more likely, from a desire to better understand the feasibility and impacts of the development so that a sound judgement may be made as to its desirability or undesirability.

2. The developments included on the list are meant to be suggestive only. They are taken from discussions over several months with tribal members and with other researchers and seem

to represent those developments which are of general interest. It is hoped that further discussions will result in adding other developments to the list, deleting some of the developments which appear on it, and changing some of them to more closely reflect the interests of the Tribe.

3. For the first year's project, which is to be completed in April of 1977, only a small number -- 2 or 3 -- of the alternative developments can be analysed. Thus, care should be taken to assure that those developments which are of immediate interest are included in the discussion list and selected for analysis. Analysis of other interesting, but less pressing, potential developments should be put off to next year.

4. No explicit water related developments are included. This is, because both the legal and the hydrological situations regarding this valuable resource are as yet too unclear to permit useful analysis of developments intended to utilize the water resource itself. The role of water and its use in the developments which are included in the list and which will be added to the list will be included in the analysis of these developments.

5. This list is intended to cover the whole range of large scale projects undertaken primarily for the purpose of selling goods and services off the Reservation. Thus, the as yet unresolved question of who should undertake the feasibility analysis -- whether it be EDA, CDC, or NCRP -- will have to be decided in selecting projects for analysis.

POTENTIAL DEVELOPMENT ALTERNATIVES
FACING THE NORTHERN CHEYENNE TRIBE
-- suggestive list for discussion --
October, 1976

Coal Based Developments

1. Very Small Scale Coal Mine for Use on or Near the Reservation.

   This development would be like the Midway Mine -- perhaps just further use of that mine. The purpose would be to provide low cost coal, primarily for space heating, to residents, businesses, and agencies on the Reservation and selected off Reservation users.

2. Small to Medium Scale Coal Mine for Sale of Coal to Midwestern or Pacific Coast Markets.

   This development would consist of a strip mine producing about one million tons per year. Sale of the coal would be to Midwestern or Pacific Coast markets, primarily utilities for coal fired power plants in the market areas. A rail line to the mine would almost certainly be required to ship out the coal.

3. Large Scale Coal Mine for Sale of Coal to Midwestern or Pacific Coast Markets.

   This development would consist of a larger strip mine than would 2., above. It would produce about 5 million tons per year and sell in the same market or markets as would 2. It would also require construction of a rail line.

4. Large Scale Coal Mine with On-Reservation Power Plant.

   This development would consist of a large scale strip mine like that of 3. above, and includes also a large coal fired mine mouth power plant. This development would not require a rail line for shipping out coal, but would require electrical transmission lines. The market for the power would be either the Midwest or the Pacific Northwest. The Tribe's air standard upgrading proposal to EPA may indicate a judgement against this development.

5. In-Situ Coal Based Gas Extraction

Basically, this development would involve drilling into coal seams and burning the coal while still underground. This burning produces methane gas which can be drawn off and burned to produce heat or perhaps used for other purposes. The advantage of in-situ processes is that they do not require extensive disturbance of the land surface. Some Tribal members are more knowledgable about this potential development than are the NCRP economists -- it is hoped that they will assist in researching in-situ processes if they are selected for analysis.

Development of Reservation Timber Resources

Two basic parts of a timber based development must be considered. The first is logging, the second is milling. It appears most likely that timber resource development will involve use of the Ashland Mill, but other milling alternatives should be added if they are considered likely. The scale of the logging operation on the Reservation should probably be at the sustained yield level, but smaller or larger scales could be considered if desired. All potential products, including "posts and poles" from thinning and trimming operations should be included. Keeping this in mind, the following four timber based potential developments are suggested for discussion:

6. Tribally owned and operated logging and milling.

7. Tribally owned and operated logging operation selling to non-Tribal mill.

8. Non-Tribal lease of logging operation with Tribally owned and operated mill.

9. Non-Tribal lease of logging operation selling to non-Tribal mill.

Note that any Tribally owned and operated mill could also serve as a general purpose mill servicing logging operations off the Reservation as well as those on the Reservation.

Further Development of Agricultural Activity

Agriculture already is the primary economic activity on the Reservation as well as the basis of what many Northern Cheyennes understand as their way of life. Thus enhancement of this activity is of interest to many.

Certainly, many Northern Cheyenne have a very good understanding of current agricultural conditions and opportunities on the Reservation and of potentials for further expansion of agriculture as an income producing business. It is hoped that these people can be closely involved with outside exports in both selecting such projects for analysis and actually carrying out the analyses.

Remembering the above, the following four potential developments are put forward for discussion. Obviously a great deal of research and discussion will be required to narrow down these general areas of development to specific proposals for feasibility and impact analysis.

10. On Reservation Range Improvement.

    It has been suggested that some types of investment in range improvement may result in a much higher grazing carrying capacity on Reservation land. These investments would primarily consist of a system for storing and redistributing water so that more land could be grazed and land which is currently grazed could support more cattle.

11. Off-Reservation Grazing on Federal Land.

    Some background work has been done to determine federal policy and practices in use of federal lands for grazing. The Tribe has indicated that this may be a desirable option for investing funds to produce revenue to the Tribe for both running the Tribal government and providing income to Tribal members.

12. On-Reservation Integrated Cattle Operation.

    This development would consist of a completely integrated cattle operation from cow-calf operations through the feedlot and possibly including a slaughter-packing house to produce finished meat. This development would probably require a rail line for export of fed cattle to, probably, Midwestern packers or of finished meat to whatever markets are found.

13. Cropping Irrigation.

    It may be possible to utilize water on the Reservation to support extensive cropping agriculture. Significant technical questions concerning soil, drainage, etc., conditions will have to be resolved before specific crops and potential locations can be selected, but if this appears to be a potentially attractive development, this technical research could be undertaken.

Development of Other Underground Resources

There has been some interest expressed in investigating some other underground resources which are believed to underlie the Reservation. In all these cases, there is geological evidence that the resources are, but much exploratory work would be required to determine exact locations and extents before feasibility and impact analyses could be started. Thus, if these developments are selected, analyses of the costs of exploration projects would be all that could be accomplished this year. Real feasibility and impact analyses would have to wait until the exploratory drilling projects were completed. With this in mind, the following areas of potential development are suggested for discussion:

14. Oil and Gas Development.

15. Uranium Mining.

16. Geothermal Heating.

17. Geothermal Electrical Generation.

It is hoped that this suggestive list of potential developments will serve to stimulate discussion as to which potential developments the Tribe is interested in having analysed for feasibility and impact and that soon a small list of 2 or 3 developments will be selected for analysis this year.

Appendix A.2

Determine of Adjusted Survival Rates, Base Year Population, Fertility Rates, Temporarily Present Non-Residents, and Temporarily Absent Residents

Refers to: Chapter II.B.1.

Chapter IV of Volume II identified and briefly discussed all data items that were collected and evaluated by The Rho Corporation (Rho). It is the purpose of this appendix to discuss in detail the specific procedures employed by Rho to create, using data items described in the demographic portion of Chapter IV, the five data sets required to produce population projections for the Northern Cheyenne Research Project. The five data sets are: survival rates, base year population, fertility rates, temporarily present non-residents (TPNR) and temporarily absent residents (TAR).

a. Survival Rates

A Survival rate expresses the probability of a person surviving for some specified amount of time. The population projection technique requires five year survival rates that are sex and five year age group specific. No rates for Northern Cheyenne Indians meeting these specifications could be found so Rho undertook the job of collecting information that could be used to formulate the rates. The best information obtained was "1969-1971 Montana Resident Deaths by Single Year of Age, Race and Sex." This, in conjunction with Montana Indian population counts by five year age group and sex from "1970 Bureau of the Census Subject Report--American Indians" (PC(2)-1F) was used to create the required survival rates in the following manner:

$$\text{Five Year Survival Rate}_{ase} = 1 - \left[\frac{5/3 \ (\text{Deaths}_{ase}^{1969\text{-}1971})}{\text{Population}_{ase}^{1970}} \right]$$

Where subscripts:

a = five year age group

s = sex

e = population group (Montana Indian & Total Population)

Rates were derived for both Montana Indians* and for the entire Montana population. When compared with other survival rates as observed in the Western United States, the Montana rates were determined to be acceptable for both Total Montana and Montana Indians with the exception of a few Indian age groups which deviated from the expected smooth rate curve and a very low survival rate in the Indian 75+ age group for both males and females. These abnormal rates were most likely due to the "small number of events problem" and were smoothed to make them fit what was thought to be a reasonable survival rate curve.**

Infant survival rates (for the first five years of life) are part of the survival rate data set; they require special calculation procedures. The rates were created with a combination of the before mentioned death information and "1969-1971 Montana Resident Births by Age of Mother, Race and Sex of Child." The method assumes that births are distributed equally over a five year period and for Indians, that survival probably is equal for the third, fourth, and fifth year of life.

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* For this project all Montana Indians are assumed to have the same survival behavior.

** See Table A.2.1. for Adjusted Survival Rates

The following is the equational description of the method:

Let: DR_{0-1} be the death rate for the 0 to 1 age group, then

$$\left[\frac{\text{Deaths}^{1969-1971}_{a=0 \text{ to } 1,se}}{\text{Births}^{1969 \text{ to } 1971}_{se}}\right]$$

Let: $DR_{1 \text{ to } 2}$ be the death rate for the 1 to 2 age group, then

$$\left[\frac{\text{Deaths}^{1969 \text{ to } 1971}_{a=1 \text{ to } 2,se}}{2/3 \text{ Births}^{1969 \text{ to } 1971}_{se} - \text{Deaths}^{1969 \text{ to } 1971}_{1=0 \text{ to } 1,se}}\right]$$

Let $DR_{2 \text{ to } 3}$ be the death rate for the 2 to 3 age group, then

$$\left[\frac{\text{Deaths}^{1969 \text{ to } 1971}_{a=2 \text{ to } 3,se}}{1/2 \text{ Births}^{1969 \text{ to } 1971}_{se} - \text{Deaths}^{1969 \text{ to } 1971}_{a=0 \text{ to } 2,se}}\right]$$

Let: 1 - DR = a single year survival rate

Let: The product of five one year survival rates equal the infant survival rate.

$$(1-DR_{0 \text{ to } 1}) * (1-DR_{1 \text{ to } 2}) * (1-DR_{2 \text{ to } 3}) * (1-DR_{2 \text{ to } 3}) * (1-DR_{1 \text{ to } 3}) = \text{Infant Survival Rate}$$

Table A.2.1.

Adjusted Five Year Survival Rates

Montana Indian*			Montana**		
	Male	Female	Male	Female	
Infant	.9579	.9647	.9664	.9754	Infant
0-4	.9465	.9585	.9690	.9765	0-4
5-9	.9985	.9950	.9970	.9975	5-9
10-14	.9960	.9960	.9970	.9985	10-14
15-19	.9720	.9825	.9900	.9955	15-19
20-24	.9643	.9845	.9830	.9965	20-24
25-29	.9567	.9685	.9880	.9940	25-29
30-34	.9490	.9670	.9870	.9940	30-34
34-39	.9325	.9535	.9825	.9905	35-39
40-44	.9190	.9440	.9735	.9880	40-44
45-49	.9055	.9290	.9670	.9815	45-49
50-54	.8995	.9225	.9440	.9700	50-54
55-59	.8615	.8967	.9145	.9580	55-59
60-64	.8230	.8709	.8715	.9395	60-64
65-69	.7845	.8450	.8090	.9040	65-69
70-74	.7015	.6960	.7080	.8465	70-74
75+	.5500	.5600	.4205	.6070	75+

* Used in the "Constant Vital Rates" and "Decreasing Fertility" population projections.

** Used in the "increasing Survival" and the "Increasing Survival-Decreasing Fertility" projections.

Note: The survival rates in this table express the probability that a person in the specified age group at the beginning of the period will still be alive at the end of the period. Thus, for example, 0-4 age group refers to all those who were born between Midnight, December 31, 1970 and Midnight, December 31, 1975, and is used to survive this group to the 5-9 age group in 1980. The infant survival rate is the probability that an infant born during the 1975-80 period will survive to become part of the 0-4 age group in 1980.

b. Base Year Population

The population projection technique requires a base year population by five year age group, sex, ethnic group and area. Rho determined that the Summer/Fall, 1976 Northern Cheyenne Tribal Census was best suited to fulfill this need. It gives the age, sex, and ethnic specificity required and has adequate areal breakdown i.e., Northern Cheyenne Reservation and off Reservation (Ashland and Mission Grounds). However, it was decided that 1976 would not be a good base year, since all subsequent projection reports would not fall on years that correspond with U. S. Census counts i.e., if 1976 was used the reports would fall on 1981, 1986, and 1991 while U. S. Census information is reported every 10 years (1970, 1980, 1990). In order to rectify the problem, a method was devised to adjust or "restore" the 1976 Tribal Census so that it would reflect the 1975 areas population.

The method is just the reverse of aging and surviving a population. That is, one adds deaths between mid-1975 and mid-1976 and subtracts births to arrive at the restored 1975 population from the 1976 Census. Formally, rather than multiplying the number of people within an age group by a survival rate to determine the number of survivors over a period of time, one divides the number of people within an age group by a survival rate to, in effect, restore those people who died over that same period of time. Since the desired period of time in this case is one year, five year survival rates are first converted to one year survival rates.

$$\text{one year survival rate}_{as} = 1 - \left[\frac{1\text{-five year survival rate}_{as}}{5}\right]$$

Then the 1976 population is rearranged into advanced five year age groups (1-5, 6-10, 11-15, ..., 76+). Finally because the age groups are advanced

and do not reflect the same groups the original survival rates were produced for, one year survival rates must again be adjusted to correspond with the advanced five year age groups. This is one as follows:

$$\text{Restoration rate}_{aa,s} = 1/5\ (\text{one year survival rate}_{a+5,s}) + (4/5\ \text{one year survival Rate}_{as})$$

Where subscripts:

aa = advanced five year age groups

a = 5 year age groups

s = sex

Now, the 1976 population by advanced age group and sex is divided by the adjusted one year survival rates; the result of which is a 1975 census equivalent population for the desired age groups (0-4, 5-9, 10-14, ..., 75+). The age groups change because members become one year younger e.g., in the 5-10 age group persons who were 6 years old in 1976 are youthed to 5 years of age in 1975 and persons who were 10 in 1976 are 9 in 1975, hence what was a 6-10 age group becomes a 5-9 age group in 1975. The equation is:

$$\text{Census population}^{1975}_{asei} = \frac{\text{Census population}^{1976}_{aa,sei}}{\text{Restoration rate}_{aa,s}}$$

where subscripts:

aa = advanced five year age group

a = five year age group

s = sex

e = ethnic group (Northern Cheyenne or Other Indian)

i = area (on Reservation or Northern Cheyenne Census defined off Reservation)

c. Fertility Rates

A fertility rate expresses the number of children an average woman at a given age will bear over some specified amount of time. The population projection technique used for this project requires five year fertility rates by five year age group for women in the child bearing ages (15-44). Rates specific to the Northern Cheyenne would be preferable, but as in the case of survival rates the necessary data was found to be unavailable or nonexistent. The most reliable data from which fertility rate estimates could be constructed was birth information from "1969-1971 Montana Resident Births by Age of Mother, Race and Sex of Child," and Montana Indian population count by five year age group and sex from the "1970 Bureau of Census Subject Report-American-Indians" (PC(2)-1F).

Fertility rates are calculated in the following manner:

$$\text{Fertility Rate}_{afei} = \frac{5/3\ (\text{Births}_{afei}^{1969\text{-}1971})}{\text{Population}_{afei}^{1970}}$$

where subscripts:

a = five year age groups (15-19, 20-24, ..., 40-44)

f = female

e = Indian

i = the State of Montana

The calculated rates* fit the same general pattern over age groups as other Indians in the western United States with the exception of the three early age groups and especially 20-24 age group. The 20-24 age group's five year fertility rate (2.006**) was judged far too high especially when compared to the same Indian age group fertility rate in Utah (1.377)--Utah is considered to have very high Indian fertility rates.

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* See Table A.2.2.

** See Figure A.2.1.

It is hypothesized that either non-resident Indian females come to Montana to have children, that the 1970 Census undercounted female Indians in the 20-24 age group, or both. Harvey Lich of the Billings area Indian Health Service office views these as reasonable explanations of this peculiarity in the data, but does not have any hard supportive evidence.

In order to produce estimates of fertility rates corrected for these unrealistically high younger age group observations, Rho undertook to make some comparisons of the calculated Montana Indian fertility rates with similar rates produced using different calculation techniques. Comparisons had to be made using general fertility rates, i.e., rates for the whole population rather than for age group details. This is necessary because the number of cases in the data for Montana Indians by age group is small and unusually high or low figures are more likely to be caused by year to year fluctuations than by the "real" behavior of the population. If the number of cases were larger, the effect of such fluctuation would tend to be reduced and age group specific comparisons could be made. General birth rates (GBR) are those that apply to an aggregated group--in this case the group being total women in the child bearing ages 15-44 as opposed to five year age group fertility rates, as described above, which are referred to as central rates.

First a general rate, derived by applying the calculated five year rates to the average number of Northern Cheyenne Females between 1970 and 1975,* was compared to a general rate based solely on Northern Cheyenne Census data adjusted (restored) to 1970 and 1975.* For ease of discussion the former will be referred to as vital statistics general birth rate (VSGBR) and the latter as restored general birth rate (RGBR). If the hypothesis that the 20-24 rate is unrealistically high is correct, then VSGBR would be higher than RGBR. Equationally, the two were calculated as follows:

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* In both these cases the 1970 and 1975 Northern Cheyenne Population was derived in the manner discussed above under part c). Base year Population.

$$VSGBR = \frac{\sum_a FR_a \left(RF_a^{1970} + RF_a^{1975}\right) / 2}{\frac{RF_{15-44}^{1970} + RF_{15-44}^{1975}}{2}}$$

$$RGBR = \frac{RB\ 1970\text{-}1975}{\frac{RF_{15-44}^{1970} + RF_{15-44}^{1975}}{2}}$$

Where:

a = five year age group

FR = derived five year fertility rates presented in table

RF = Northern Cheyenne Reservation female Indian population derived by restoring the 1976 Tribal Census females.

RB = Births to Indian mothers on the Northern Cheyenne Reservation between 1970 and 1975 calculated by restoring the 1975 restored 0-4 age group to 1970 producing a -4 to 0 age group which is equivalent to births between 1970 and 1975.

The results supported the hypothesis that calculated five year rates for the younger age groups were too high i.e., VSGBR equaled .9962 while RGBR equaled .8577.

To further test theories that fertility rates calculated with Montana birth information were too high, the method used to calculate RGBR was applied to information in "Bureau of the Census Subject Report-American Indians (PC(2)-1F." General birth rates were calculated for both Montana and Northern Cheyenne Reservation female Indians ages 15-44 for the period 1965 to 1970 as follows:

$$\frac{BNC_{0-4}^{1970} \;/\; ISR_{0-4}}{\left[\sum_{a=15=19}^{40-44}\left(\frac{NCI_a^{1970}}{SR_a}\right)\right] + \left[\sum_{a=15-19}^{40-44}\left(NCI_a^{1970}\right)\right]} = CNCGBR$$

$$2$$

$$CNCGBR = \frac{362}{433} = .8360$$

$$\frac{BI_{0-4}^{1970} \;/\; ISR_{0-4}}{\left[\sum_{a=15-19}^{40-44}\left(\frac{FI_a^{1970}}{SR_a}\right)\right] + \left[\sum_{a=15-19}^{40-44}\left(FI_a^{1970}\right)\right]} = CMGBR$$

$$2$$

$$CMGBR = \frac{3621}{4921} = .7358$$

Where:

CMGBR = Census Montana Indian General Birth Rate 1965-1970

CNCGBR = Census Northern Cheyenne General Birth Rate 1965-1970

ISR = Infant Survival Rate

FI = Montana Female Indian

NCI = Northern Cheyenne Female

BI = Montana Indian 1970 0-4 age group

BNC = Northern Cheyenne 1970 census 0-4 age group

SR = Calculated five year survival rate

The results, Montana Indian GBR equals .7358 and Northern Cheyenne Indian GBR equals .8360, reinforced opinions that .8577 was a reliable GBR and that calculated five year fertility rates were too high.

It was decided that the calculated rates would be adjusted so that they would produce a GBR close to .8577 when applied to the average number of Northern Cheyenne Reservation Indian females between 1970 and 1975. The rates for females 15-19 and 25-29 were reduced by .025 and the rate for females 20-24 was reduced by .606.

Fertility rates that would produce zero population growth (ZPG) were also calculated for Montana Indians. In the method used, ZPG completed cohort fertility (the average number of children born to women by the time they finish having children which would just replace deaths over the generation and thus lead to a constant population or ZPG) is calculated first:

$$\text{ZPG completed cohort fertility} = \frac{1}{(P)\ (MCA)}$$

Where: P = proportion of total births that are female

MCA = probability of a female reaching the mean child bearing age.

The ZPG completed cohort fertility figure estimates the number of children the average women reaching age 45 must have in order to produce a stable population given constant survival rates. Then the result, in this case 2.29, is distributed over age groups 15-19, 20-24, ..., 40-44 using the same percentage distribution displayed by the adjusted five year fertility rates. For comparison purposes, ZPG completed cohort fertility for the U. S. is estimated at 2.11. The difference between the two groups' rate is mostly due to differences in female survival rates (Indian survival rates are lower) and differences in birth proportions (Indians have a lower proportion of female births).

Figure A.2.1.

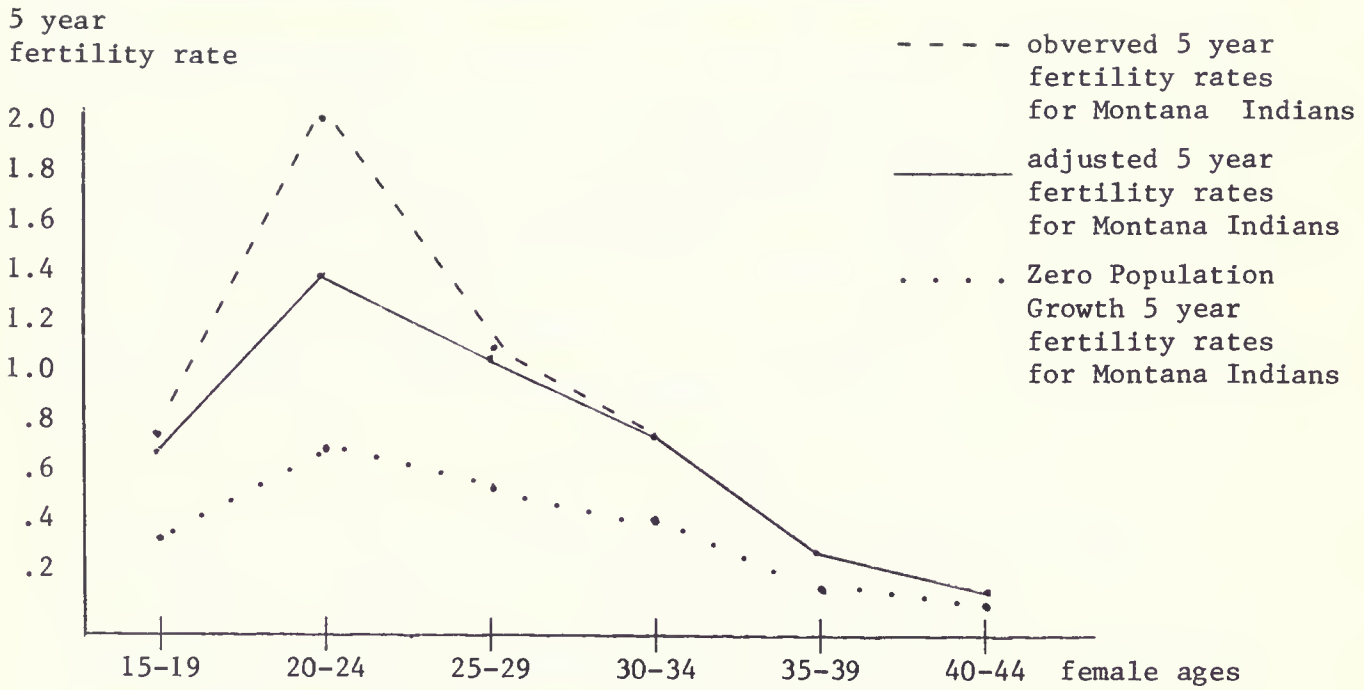

Table A.2.2.

Five Year Fertility Rates

Female Ages	Observed Montana Indian	Adjusted Montana Indian**	Zero Population Growth*
15-19	.7800	.7550	.3834
20-24	2.0060	1.4000	.7111
25-29	1.1135	1.0885	.5527
30-34	.7930	.7930	.4028
35-39	.3518	.3518	.1788
40-44	.1118	.1118	.0599

*Used in the "Decreasing Fertility Rate" and the "Increasing Survival-Decreasing Fertility" projections.

**Used in the "Constant Vital Rates" and "Increasing Survival Rate" Projections.

d. Temporarily Present Non-Residents

Temporarily present non-residents (TPNR) is a data set required to determine the number of people who are likely to reside on the Reservation temporarily, or who are there for reasons other than to seek employment. Examples are college students and military personnel who have returned to visit, and children from off the Reservation who are temporarily present in Reservation-area boarding schools. These persons are to be excluded from the area's permanent population when making projections of the future population.

Investigation indicated that the TPNR data set, on the Northern Cheyenne Reservation and in the Tribal census off-Reservation area, is composed of both Indians from out of the Tribal census area living at boarding facilities in the census area, and of Northern Cheyenne children living at the Northern Cheyenne Home. Data sources include: 1976 school enrollment records from Busby Grade School, Busby High School, Labre Grade School and Labre High School; and numbers of non-Cheyenne boarders at Northern Cheyenne Home as developed by Jean Nordstrom at the Northern Cheyenne Research Project. The school enrollment records enabled Rho to determine the age, sex, home address and whether the student was Northern Cheyenne or other Indian. The Labre School records also helped Rho identify non-Cheyenne boarders at Northern Cheyenne Home.

Four groups of Temporarily Present Non-Residents were determined. Two of the groups, one labelled "Northern Cheyenne on-Reservation"

and the second labelled "Other Indian on-Reservation," are determined for the Busby boarding school, which is located on the Reservation proper. The other two groups are labelled "Northern Cheyenne off-Reservation" and "Other Indian off-Reservation." These two groups are determined for the Labre boarding school and the Cheyenne Children's Home which are located just off the Reservation in the census area called Mission Grounds.

The temporarily present non-resident group called "Northern Cheyenne on-Reservation" consists of Northern Cheyenne children boarding at Busby school whose home addresses are at some distance from the Reservation, such as Hardin or Sheridan, Wyoming. They are considered to belong to Northern Cheyenne families who are not reservation residents. (Note: While it is true that some of these families currently residing off-Reservation may later return to the Reservation, it is assumed that other families currently residing on the Reservation might later move off. In other words, in the population projections presented here, it is assumed that while individual families may move on and off the Reservation, the overall number of families on the Reservation at any one time and the overall number of families off the Reservation at any one time will be unaffected by such moves.) The estimated number of Northern Cheyenne boarders at the Busby school with off-Reservation home addresses in 1975 was only 3.

The second group of TPNR's is "Other Indians on-Reservation." This group consists of non-Cheyennes who are boarding at Busby school and whose home addresses are from off-Reservation areas. The number in this group in 1975 was estimated as 34.

The third group of TPNR's is "Northern Cheyennes off-Reservation." This group consists of Northern Cheyenne children living at the Cheyenne Home on the Mission Grounds whose real home is with their parents on the Reservation proper. The number of such people was estimated to have been 37.

The fourth group of TPNR's is "Other Indians off-Reservation." This group consists of non-Cheyenne Indians who are boarding at Labre plus non-Cheyenne Indians who are living at the Cheyenne Home. The estimate of such people in 1975 was 87.

Finally the TPNR category, "Northern Cheyenne off-Reservation," was set equal to the number of Northern Cheyenne boarders at Northern Cheyenne Home (37) and divided by the Northern Cheyenne Tribe's resident Reservation population to form a TPNR rate specific to the Northern Cheyenne Home and the on-Reservation Northern Cheyenne population by age and sex. The equation is:

$$\frac{NCB_{as}^{1976}}{NCRPR_{as}^{1976}} = NCHRAT_{as}$$

where: NCB = Northern Cheyenne boarders at Northern Cheyenne Home in 1976

NCRPR = Northern Cheyenne Tribe's resident Reservation population in 1976.

NCHRAT = TPNR rate for Northern Cheyennes in the off Reservation census area.

a = five year age group

s = sex

TPNR Rates for Northern Cheyenne Indians in the Off-Reservation Census Area

Age	Male	Female
0-4	.0220	0
5-9	.0239	.0209
10-14	.0690	.0182
15-19	.0127	.0261

e. Temporarily Absent Residents (TAR)

The TAR data set is also required for the non-employment related migration portion of the population projection technique and is expressed as a rate (TARRAT). It is just the opposite of the TPNR data set, i.e., TAR includes any person who is away from an area temporarily, such as college students and military personnel. These are to be included in the area's permanent population for projection purposes. TAR's dimensions are age, sex, and ethnic group.

Investigation of all possible data sources showed that TAR for the Tribal Census area included only Northern Cheyennes who were away at college, vocational schools, in the military, or boarding at the Northern Cheyenne Home, and dependents of college and vocational students. Note that Northern Cheyenne Cheyenne Home boarders are included as TAR's as well as TPNR's. This is, of course, to reflect the fact that they are TAR on the Reservation and TPNR at Mission Grounds. Numbers of Northern Cheyenne in the military by age and sex were provided by recruiters in Billings for the Army, Navy, Marines, and Air Force. As mentioned in the "Data Development" section of the report these numbers are only estimates. Jean Nordstrom of the NCRP, after collaboration with Sam Bigfoot and Gary Braine of the Career Development Program provided numbers of Northern Cheyenne at Northern Cheyenne Home and numbers of Northern Cheyenne attending college or vocational schools, including dependents. This information is by age and sex with the exception of dependents, which were only identified as being a spouse or child of a particular student.

To solve the age of dependent problem, it has been assumed that a spouse's age is the same as the student he or she is associated with, and, after collaboration with Gary Braine, that 70% of dependent children are in 0-4 age group and 30% are in the 5-9 age group.

f. Population Projections

Using the data sets described above, the methodology described in Appendix B.2, Rho produced detailed population projections for the years 1980, 1985, and 1990. These projections were provided in five-year age, sex, and ethnic-specific detail. Projections were produced for four different vital rate assumptions, as described in Chapter II. The detailed projections were provided to the Northern Cheyenne Tribe and Northern Cheyenne Research Project for use in planning and decision making.

Appendix A.3.

Summary of Legal and Policy

Conditions Regarding Leasing of Federal Land

Refers to: Chapter II.B.2.

Summary of Legal and Policy Conditions Regarding Leasing of Federal Land

Prepared by

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June, 1976

I. Laws and legislation pertinent to leasing federal lands.

A. Taylor Grazing Act (June 28, 1934)

1. Section 3 - deals with leasing of land for grazing

a. Bureau of Land Management Personnel, State Office Salt Lake City, Utah

1) Generally the best blocked grazing land and land within established grazing districts is leased under this section.

2) Licenses were issued soon after the enactment of the Taylor Grazing Act 1934.

3) Grazing privileges from which licenses are issued are legally tied to a piece of private (base) property.

4) Impossible to get someone else's license unless by purchasing their base property or by transferring grazing privileges from one property to another.

b. Methods of Estimating Benefits and Costs of Public Range Investments. BLM instruction memo number 76-250.

1) Grazing privileges are inseparable from particular private ranching properties. P.(6)

c. A reasonable annual payment per AUM is required.

2. Section 15 - also deals with leasing of land for grazing.

a. BLM Personnel, State Office, Salt Lake City, Utah

1) Generally applies to land outside established grazing districts & scattered BLM holdings.

2) Leases issued and reissued according to qualification of applicants in terms of contiguousness to federal land, ability to use i.e. does applicant have enough private land for winter feeding, etc., historical use, suitability of operation, etc.

a. Leases issued for 1 - 10 year periods at he end of which they come up for renewal.

b. Possible to apply for and obtain a permit already held when a lease expires if one has better qualifications.

b. A reasonable annual payment per AUM is required.

B. U. S. CFR Part 2920 Special Land Use Permits

1. Objectives

a. To permit beneficial uses of federal land for special purposes not specifically provided for by existing law i.e. ski resorts

2. Rental charges

a. Permittees are required to pay federal agency the fair market value of privilege granted

b. Federal Government and agencies of states and political subdivisions thereof are exempt from payment.

c. According to the CFR 2920.4 Indian tribes would not qualify as an agency of the federal government or agencies of states and political subdivisions thereof.

C. The Recreation and Public Purposes Act (1926) U. S. CFR 2740

1. Only available to federal and state instrumentalities and political subdivisions including counties and municipalities and nonprofit organizations. At this point in time tribes are not considered political subdivisions as legally defined and therefore they must pay fair market value for use of the land under (U. S. CFR 2471.7).

a. All nonprofit organizations must pay e.g. boy scouts have to pay for national forest use. (Horton) Salt Lake City.

D. Indian allotments of land

1. Similar to Homestead Act in that lands qualifying under the act were disposed of many years ago.

a. Land must be classified for allotment

1) No known land is currently classified under the Indian Allotment Act.

2) Lands subject to Indian allotments are lands which meet the following definitions:

40 acres of irrigated

80 acres of non-irrigated agricultural land

160 acres of grazing land

b. Like Homestead Act, the Indian Allotment Act requires that a person must be able to make a living on the land.

c. Final decision on whether land will be disposed of or not is up to the discretion of the Secretary of Interior.

E. General mining laws of 1872 in circular 2289

1. Apply to BLM and national forest

2. Do not apply to Indian lands

F. Oil and gas leasing - circular number 2357

1. Applies to all federal land except national parks and monuments, incorporated towns, etc., does not apply to Indian lands.

II. Where to apply for leases or permits

A. National Forest i.e. Custer

Billings, Montana

Buffalo, Wyoming

B. BLM - Miles or Billings, Montana - depending on district interest in Buffalo, Wyoming

State Offices: Montana - Billings; Wyoming - Cheyenne

III. General information on grazing and recreation

A. Grazong on federal land

1. General

a. Land divided into grazing allotments, individual or group

b. Productivity varies according to type of foliage, rainfall, and geology - Animal Unit Months (AUM) is a measure of how much food a cow and calf will eat in one month. Range land is measured by AUM and rented on a fee per AUM.

2. Custer National Forest

a. Ernest Kehrberg, National Forest Service, Billings, Montana

1) All existing grazing allotments are under permit. See Title 3600 Code of Federal Regulation Sec. 231.3.

2) If range improvements are made there is a possibility of increasing the number of permits but one must hold a lease in order to make improvements i.e. Northern Cheyenne don't hold any leases, therefore they cannot initiate or contribute to range improvements.

3) BLM land near reservation

a. Montana

B. Recreation - ski resort

1. Requires a special permit and payment of an annual fee.

2. Mescalero Apache Case - information obtained from Chuck Jourden of National Forest Service.

a. Sierra Blanca Ski Area

1) 80 acres

2) New Mexico, Lincoln National Forest

3) They pay 1½% of gross with $1,000 minimum

3. Land available in Montana

a. Custer National Forest

Appendix A.4.

Feasibility - Large Scale Coal Mine

Refers to: Chapter III.B.4.

Persons contacted or recommended for outline information:

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The following tables present the assumptions and results of the feasibility analysis conducted for a 4.6 million tons per year strip mine in or near the Tongue River Valley. It should be noted that this analysis is provisional and not based on actual conditions at a particular site. It does, however, consider information that is representative of strip mines in the Northern Great Plains and does consider general conditions prevailing in the Tongue River Valley as regards overburden depth and seam thickness. An analysis of a particular site would require the appropriate exploration and engineering reports. The methodology, however, would remain essentially the same.

The preliminary indications of this analysis are that, at a variety of reasonably assumed mine mouth selling prices, the development of a large scale strip coal mine in this area for the sale of coal to the general market should be expected to be a highly profitable undertaking. It is a matter for further analysis and negotiation how these profits would be allocated among the Northern Cheyenne Tribe, the State of Montana, the U. S. Government, and outside private developers and financiers.

Summary of Assumption and results, 4.6 MM-tpy strip mine

Output - 4.6 million tons per year

Mine life - 20 years

Location - Tongue River Valley, Southeastern Montana

Average overburden depth - 175 feet

Average coal seam thickness - 50 feet

Recovery rate - 90 percent

Annual acres stripped - 57.75 acres

Initial capital investment - $22,829,500

Equipment, materials & personnel costs - 1975 indicies and based on Bureau of Mines Information Circular 8703, Basic Estimated Capital Investment and Operating Costs for Coal Strip Mines, U. S. Department of the Interior

Note: Personnel costs & union benefits are now covered by the Western Surface Agreement of 1975 and not the Bituminous Wage Agreement of 1975 as assumed in the circular. Unavailability of information regarding the former Agreement precluded its use here.

Transportation - rail

Market - general

Returns - without severance tax liability:

Mine Mouth Price $ per ton	Net Revenue[1]	Rate of Return (percent)[2]	Average Annual Returns[2]
$5	$23,000,000	51.0	$11,648,500
10	46,000,000	152.7	34,867,500
15	69,000,000	253.6	57,895,600
20	92,000,000	354.4	80,903,200

1. net of transportation charges

2. before taxes, interest and lease payments

Returns - with severance tax liability of 30% of contract price per ton, the first 5,000 tons produced per year being exempt:

Mine Mouth Price $ per ton	Net Revenue[1]	Rate of Return (percent)[2]	Average Annual Returns[2]
$ 5	$16,500,00	19.1	$ 4,432,370
10	32,215,000	92.0	20,539,870
15	48,322,500	163.0	36,947,370
20	64,430,000	233.6	52,754,870

1. net of transportation charges

2. before taxes, interest, and lease payments

Capital Investment Summary, 4.6 MM-tpy strip mine

	Quantity	Total Cost
Dragline	1	$ 6,510,000
Bulldozer (with dragline)	2	302,400
Drill (overburden)	1	586,500
Wheel tractor scraper (with overburden drill)	2	538,800
Cable handler and reel	1	84,500
Coal Drill	1	35,000
Coal Shovel	1	1,440,000
Front-end loader (with coal shovel)	1	364,700
Truck (coal hauler)	8	2,374,400
Road grader	1	86,800
Wheel tractor (reclamation & roads)	3	808,200
Bulldozer (reclamation & roads)	3	453,600
Water truck	1	43,200
Lubrication service truck	1	40,500
Mechanic truck	1	11,700
Welding truck	1	9,600
Electrician truck	1	9,600
Supply truck	1	9,000
Explosive truck	1	24,000
Pickup truck	3	18,000
Forklift	1	8,600
Crane truck	1	115,200
Pump (portable)	3	10,500
Floodlights and towers		14,400
Communications		10,800
Substation (10,000 kV-A)	2	216,000
Disconnect skid	4	48,600
Breaker skid	4	105,600
Substation (1,000 kV-A)	2	40,500
Substation (150 kV-A)	1	16,200
Connection Box	8	13,000
Cable		490,500
Explosive storage facilities		33,300
Office & washhouse	1	217,800
Shop & warehouse	1	737,000
Oil and fuel storage facilities		20,000
Initial road construction		83,800
Site preparation		67,000
Exploration		100,000
Total Direct		$16,099,300
Field indirect		320,400
Total Construction		$16,419,700

Capital Investment Summary, 4.6-MM-tpy Strip Mine - Continued

	Quantity	Total Cost
Carried Forward		$16,419,700
Engineering		400,000
Overhead and administration		1,011,500
Contingency		2,674,700
Interest during construction, 5 percent		1,025,300
Net estimate		$21,531,200

Depreciation schedule, 4.6-MM-tpy strip mine

	Straight-line depreciation, years	Yearly charge, dollars
Dragline	20	$325,500
Bulldozer (with dragline)	10	30,200
Drill (overburden)	10	58,700
Wheel tractor scraper (with overburden drill)	5	97,700
Coal handler and reed	20	4,300
Coal drill	10	3,500
Shovel (coal)	20	72,000
Front-end loader (with coal shovel)	5	67,900
Truck (coal hauler)	7	305,200
Road grader	10	7,400
Wheel tractor scraper (reclamation and roads)	5	146,600
Bulldozer (reclamation and roads)	10	45,300
Water truck	10	4,100
Lubrication truck	10	3,500
Mechanic truck	5	2,000
Welding truck	5	1,600
Electrician truck	5	1,600
Supply truck	5	1,200
Explosive truck	5	4,300
Pickup truck	3	5,400
Forklift	5	1,600
Crane truck	10	10,100
Pump	10	1,100
Floodlights and towers	10	1,400
Communications	10	1,100
Electrical equipment	20	21,800
Cable	5	98,100
Explosive storage facilities	20	1,700
Office & washhouse	20	10,900
Shop and warehouse	20	36,900
Oil and fuel storage facilities	20	1,000
Initial road construction	20	4,200
Site preparation	20	3,400
Exploration	20	5,000
Interim equipment replacement	20	275,200
		$1,661,500
Depreciation for field indirect, engineering, overhead and administration, contingency, fee, interest during construction	20	271,600
Total		$1,933,100

Note: Rubber-tired vehicles reflect depreciation excluding tires, which are shown as an operating expense.

Manning table 4.6-MM-tpy Strip Mine

Personnel	Total	Wages[1] per day	Cost per year
Production:			
Dragline operator[2] (overburden)	3	$55.00	$ 70,200
Dragline oiler[2] (overburden)	3	50.60	64,700
Bulldozer operator [2]	5	48.13	82,900
Driller[3] (overburden)	2	48.13	21,450
Driller helper[3] (overburden)	2	45.65	20,350
Shooter[3] (overburden)	1	48.13	10,600
Wheel tractor scraper operator[3] (with overburden drill)	4	48.13	42,750
Driller[3] (coal)	2	48.13	21,450
Driller helper[3] (coal)	2	45.65	20,350
Shovel operator[4] (coal)	2	55.00	24,450
Shovel oiler[4] (coal)	2	50.60	22,550
Front-end loader operator[4] (with coal shovel)	2	48.13	21,450
Shooter[4] (coal	2	48.13	21,450
Pitman[4] (coal)	2	45.65	20,350
Truckdriver[4] (explosive truck)	1	48.13	10,600
Truckdriver[4] (coal)	14	48.13	150,100
	49		$625,700
Maintenance:[3]			
Road grader operator	2	48.13	21,450
Water truck driver	1	45.65	10,200
Lubrication truck driver	3	45.65	30,750
Supply truck driver	3	45.65	30,750
Mechanic	9	50.60	102,050
Electrician[5]	5	50.60	56,700
Machinist[5]	5	50.60	56,700
Welder[5]	5	50.60	56,700
	33		$365,300
Reclamation & road building:[3]			
Wheel tractor scraper operator	3	48.13	32,100
Bulldozer operator	3	48.13	32,100
	6		$ 64,200
Utility:[3]			
Utilityman	6	45.65	$ 61,050
Salary:			
Superintendent	1		29,000
General pit foreman	1		20,000
Pit foreman	3		49,500
Maintenance superintendent	1		22,000
Maintenance foreman	2		33,300
Mining engineer	1		22,000

See footnotes at end of table

Manning table, 4.6-MM-tpy-Strip Mine - Continued

Safety inspector	2	29,200
Office manager	1	15,550
Purchasing agent	1	15,550
Timekeeper	1	11,000
Bookkeeper	1	11,000
Warehouseman	2	20,000
	17	$278,100
Total labor and supervision	111	$1,394,350

1 Figures are for the day shift. Differentials for the other shifts are reflected in the cost per year.

2 345 days per year.

3 220 days per year.

4 240 days per year, 1 shift loading.

Estimated Annual Operating Costs, 4.6-MM-tpy Strip Mine

Direct Costs:	
Production:	
Labor	$ 686,750
Supervision	207,200
	$ 893,950
Maintenance:	
Labor	$ 365,300
Supervision	51,500
	$ 416,800
Reclamation & Road Building:	
Labor	$ 64,200
Supervision	19,400
Contract (mulching, liming fertilizing & seeding)	92,000
	$ 175,600
Operating Supplies:	
Parts	$ 230,000
Fuel, Oil & Lubrication	598,000
Drill bits	138,000
Tires	276,000
Explosives	598,000
Miscellaneous	230,000
	$2,070,000
Power	$ 600,000
Payroll overhead (40 percent of payroll)	$ 557,750
Union Welfare	$3,548,500

Indirect costs:	
15 percent of production, maintenance, reclamation labor, & supplies	519,650
Insurance .5 percent	102,500
Depreciation	1,933,100
Total Operating Costs	$10,817,850

Capital Investment Schedule, 4.6-MM-tpy Strip Mine

Year	Amount
-1	$ 9,131,800
0	13,697,700
1	275,200
2	275,200
3	275,200
4	275,200
5	2,564,900
6	275,200
7	2,649,600
8	275,200
9	275,200
10	4,263,800
11	275,200
12	275,200
13	275,200
14	2,649,600
15	2,564,900
16	275,200
17	275,200
18	275,200
19	275,200
20	-1,400,000

Estimated working capital and total capital investment, 4.6-MM-tpy strip mine

Estimated working capital:		
Direct labor	3 months	$ 348,600
Operating supplies	do	517,500
Payroll overhead	do	139,400
Indirect cost	4 months	129,900
Fixed cost	0.5 percent of insurance base	
Spare parts		113,400
Miscellaneous		49,500
Total working capital		$1,298,300
Total estimated capital investment:		
Total plant		20,505,900
Interest during construction		1,025,300
Subtotal		21,531,200
Working capital		1,298,300
Estimated initial capital investment		22,829,500
Estimated deferred capital investment		17,145,600
Total capital and deferred investment		39,975,100

Net Income, & Outlay, 4.6 MM-tpy strip mine in Tongue River Valley area with no severance taxes

Year	Operating Costs		Capital Replacements		Outlays[1]	Net Income[2] @ $5 per ton	Net Income[2] @ $10 per ton	Net Income[2] @ $15 per ton	Net Income[2] @ $20 per ton
1	$10,817,850	+	$ 275,200	=	$11,093,050	$11,906,950	$34,906,950	$57,906,950	$80,906,950
2	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
3	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
4	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
5	10,817,850	+	2,564,900	=	13,382,750	9,617,250	32,617,250	55,617,250	78,617,250
6	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
7	10,817,850	+	2,649,600	=	13,467,450	9,532,550	32,532,550	55,532,550	78,532,550
8	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
9	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
10	10,817,850	+	4,263,800	=	15,081,650	7,918,350	30,918,350	53,918,350	76,918,350
11	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
12	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,050	57,906,950	80,906,950
13	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,050	57,906,950	80,906,950
14	10,817,850	+	2,649,600	=	13,467,450	9,532,550	32,532,500	55,532,550	88,532,550
15	10,817,850	+	2,564,900	=	13,382,750	9,617,250	32,617,250	55,617,250	88,617,250
16	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
17	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
18	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
19	10,817,850	+	275,200	=	11,093,050	11,906,950	34,906,950	57,906,950	80,906,950
20	10,817,850	+	1,400,000[3]	=	9,417,850	13,582,150	36,582,150	59,582,150	82,582,150

1. excluding taxes, interest, and lease payments

2. before taxes interest, and lease costs

3. includes salvage value

Net Income, Revenue, & Outlay, 4.6 MM-tpy strip mine in Tongue River Valley area with severance taxes[1]

Year	Operating Costs		Capital Replacements		Outlays[1]	Net Income[2] @ $5 per ton	Net Income @ $10 per ton	Net Income @ $15 per ton	Net Income @ $20 per ton
1	$10,817,850	+	$ 275,200	=	$11,093,050	$5,014,450	$21,121,950	37,229,450	53,336,950
2	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
3	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
4	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
5	10,817,850	+	2,564,900	=	13,382,750	2,724,750	18,832,250	34,939,750	51,047,250
6	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
7	10,817,850	+	2,649,600	=	13,467,450	2,640,050	18,747,550	34,855,050	50,962,550
8	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
9	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
10	10,817,850	+	4,263,800	=	15,081,650	1,025,850	17,133,350	33,240,850	49,348,350
11	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
12	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
13	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
14	10,817,850	+	2,649,600	=	13,467,450	2,640,050	18,747,550	34,855,050	50,962,550
15	10,817,850	+	2,564,900	=	13,382,750	2,724,750	18,832,250	34,939,750	51,047,250
16	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
17	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
18	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
19	10,817,850	+	275,200	=	11,093,050	5,014,450	21,121,950	37,229,450	53,336,950
20	10,817,850	+	1,400,000[3]	=	9,417,850	6,689,650	22,797,150	38,904,650	55,012,150

1. 30 percent of contract price with first 5,000 tons per year exempt

2. excluding taxes, interest and lease payments

3. before taxes, interest, and lease costs

4. includes salvage value

Appendix A.5.

Impact Analysis

Refers to: Chapter II.B.5.

"First Approximation" Impact Projection Definitions and Equations

Definitions of Terms

Parameters

BE_k - Basic or Direct Employment by Industry Sector
MRE_k - Multiplier for Residentiary Employment by Industry Sector
MPOP - Multiplier for Population
$BEARNS_k$ - Basic or Direct Earnings by Industry Sector
$AAWR_k$ - Average Annual Wage Rates by Industry Sector

Variables

RE_k - Residentiary or Indirect Employment by Industry Sector
TE - Total Employment
POP - Population
$REARNS_k$ - Residentiary Earnings by Industry Sector
TEARNS - Total Earnings

Equations

Employment Equations

1. $\left(\sum_k BE_k\right)\left(MRE_k\right) = RE_k$

2. $\left(\sum_k BE_k\right) + \left(\sum_k RE_k\right) = TE$

3. $(TE)(MPOP) = POP$

Earnings Equations

4. $(RE_k)(AAWR_k) = REARNS_k$

5. $\left(\sum_k BEARNS_k\right) + \left(\sum_k REARNS_k\right) = TEARNS$

These equations are repeated for each projection period.

Average Annual Wage Rates (Rosebud County)

1.	General Construction	$ 14,000
2.	Heavy Construction	14,000
3.	Special Trade Construction	14,000
4.	Printing & Publishing	7,644
5.	Other Transportation	14,827
6.	Utilities & Communications	14,827
7.	Wholesale Trade	6,782
8.	Retail Trade	6,782
9.	Fire, Finance, Insurance, Real Estate	9,582
10.	Services	6,657
11.	Federal & Civilian	13,471
12.	State & Local Government	7,060
13.	Non-Farm Proprietors	4,960

Source: Estimated from Montana Counties' Personal Income by Major Sources 1970-1974, Regional Economics Information System, United States Bureau of Economic Analysis

Residentiary Employment Multipliers (Rosebud County)

		1975	1980	1985	1990
1.	General Construction	.0052	.0052	.0052	.0052
2.	Heavy Construction	.0756	.0763	.0763	.0762
3.	Special Trade Construction	.0311	.0314	.0314	.0313
4.	Printing & Publishing	.0022	.0022	.0022	.0022
5.	Other Transportation	.0215	.0217	.0217	.0217
6.	Utilities & Communication	.0633	.0639	.0639	.0638
7.	Wholesale Trade	.0144	.0145	.0145	.0145
8.	Retail Trade	.1875	.1892	.1892	.1890
9.	Fire, Finance, Insurance, Real Estate	.0352	.0355	.0355	.0355
10.	Services	.4977	.5022	.5022	.5017
11.	Federal Civilian	.0772	.0779	.0779	.0778
12.	State & Local Government	.3276	.3305	.3305	.3302
13.	Non-Farm Proprietors	.2452	.2474	.2474	.2471

Source: Basic-Residentiary Employment in Montana's Counties
Montana State Department of Community Affairs.

Impact (Large Coal Mine) Residentiary Employment (Rosebud County)

		(one-half construction) 1980	(full construction) 1980	1985	1990
1.	General Construction	1	1	1	1
2.	Heavy Construction	12	20	8	8
3.	Special Trade Construction	5	8	3	3
4.	Printing & Publishing	0	1	0	0
5.	Other Transportation	3	6	2	2
6.	Utilities & Communications	10	16	7	7
7.	Wholesale Trade	2	4	2	2
8.	Retail Trade	29	48	21	21
9.	Fire, Finance, Insurance, Real Estate	5	9	4	4
10.	Services	78	129	56	56
11.	Federal Civilian	12	20	9	9
12.	State & Local Government	51	85	37	37
13.	Non-Farm Proprietors	38	63	27	27
	Sub Total	246	410	177	177
	Basic Construction	200	200	0	0
	Basic Operations	56	56	111	111
	Sub Total	256	256	111	111
	Total Employment for Impact	502	666	288	288

Appendix B

Table of Contents

B.1. Suggested Impact Analysis Information Types - Discussion Paper

B.2. Impact Analysis Methodology

B.3. NCRP Staff Economist Qualifications Memo

Appendix B.1.

Suggested Impact Analysis Information Types

Discussion Paper

Refers to: Chapter III.D.

SUGGESTED IMPACT ANALYSIS INFORMATION TYPES

DISCUSSION PAPER

October, 1976

Prepared for The Northern Cheyenne Research Project

by Rho Corporation

The purpose of this discussion paper is to present the preliminary ideas of the Northern Cheyenne Research Project economists concerning the types of categories of information that should be included in the impact analysis process being designed for the NCRP. The purpose of impact analysis is to present the Tribal members and government with information concerning the changes which will be imposed on the people and the economy of the area if any or any group of the many potential major economic developments facing the Tribe actually occurs. This information regarding the potential impacts of these developments is intended to let Tribal members and their government know what to expect from the developments before they occur so that they can make intelligent decisions about whether they want the development to occur or not and also to allow them to prepare in advance intelligent plans for responding to the impacts of the developments which appear either desirable or likely.

A companion document, titled, "Preliminary List of Potential Economic Development Projects: Discussion Paper," presents and discusses some ideas regarding what major developments the Tribe will want to see analysed as to impacts. These developments are, generally, various types of (1) coal based developments, (2) timber based developments, (3) expansion of agricultural activity, and (4) development of other underground resources. That paper, like this one, is intended to stimulate discussion among Tribal members to establish what their real interests are. It should be made clear here that discussion of these developments does not necessarily mean that the Tribe wants them to come about. Rather, it means that the

developments are seen by the Tribe as either potentially desirable or potentially undesirable and more information is wanted either to try to promote them or to try to block them; or, more likely, that the Tribe wishes to have more information about the developments before deciding whether they are desirable or not.

It is hoped that the Tribal government will be assisted in two types of decision making by impact analysis information:

(1) decisions as to the desirability of the developments and, following this decision, planning to either promote desirable developments or block undesirable ones;

(2) decisions as to what government services the Tribe should provide if each development occurs and planning to actually acquire the facilities and personnel to provide those services.

In both types of decision making and planning activities, it is essential that Tribal government know such things as: How many new people will move into the area if the development occurs? How many of them will be Indians and how many not? How many new jobs will be created by the development itself and how many will be created to serve the new peoples' needs for grocery stores, banks, home construction, etc.? What payroll incomes will be produced by those jobs? What will be the participation of the Northern Cheyenne workers in new jobs? How much royalty revenue will flow to Tribal government--how much tax revenue if a tax system is adopted--how much profit revenue from possible Tribal enterprises?

Information about the most likely answers to these general questions, and others, ought to be the "raw material" which goes into Tribal decision

making. The purpose of the NCRP economists is to design and put into practice a capability to carry out the kind of analyses which produce answers to these questions. By next year, it is hoped that this capacity will be operational and run by Northern Cheyenne people trained by Rho Corporation so that the Tribe will have little or no need to rely on outside consultants for impact analysis except for small scale assistance on technical details of specific economic developments. The question which is of concern now is with deciding exactly which types of information the Tribe wishes to see in making their decisions. In other words, what details ought the analysis to emphasize in order to produce the information the Tribe would find most useful?

As an example of the use to which detailed information could be put, think about the increased number of people expected to result from a major economic development. Simply knowing how many people this is likely to be provides much helpful insight into both the desirability of the development and the increase in governmental services the Tribe may wish to plan to provide. But if this total population number could be broken down into detailed components, much more useful information can be derived. For example, if age breakdowns are provided, a much better estimate of the educational requirements of the population can be made, better planning for services to the elderly can be carried out, better estimates as to the number of new housing units needed can be made (since an "older" population tends to have larger families and hence require fewer housing units), etc. Similarly, if racial breakdowns are included, the Tribe will derive much additional useful information regarding the desirability of the development and, if the development does occur, will have much more useful information

on such issues as how much of each type of government service the Tribe wishes to provide and how much to leave in the hands of the state, county, and city governments, how much and what kind of housing to permit and promote on the Reservation and where to locate it and how much to encourage to be built off the Reservation. Still other types of breakdowns could be proposed and discussed. It is hoped that this paper will lead to discussion by the Tribe as to what types of population detail would be useful and that these can then be incorporated into the design of the impact analysis technique.

Perhaps another example would help further clarify the role that detail can play in the use of impact information for planning and decision making. If the Tribe is able to tell how much more total employment is expected to result from a major economic development, both from the development itself and from all the stores, banks, etc. that are built to serve the new population, it has a lot of useful information. But if this total number can be broken down to provide industrial sector or type of business detail much more information is made available. For example, some types of business may offer opportunities for starting or expanding businesses on or near the Reservation by either the Tribe or individual Tribal members. Knowing the size of establishment required would allow concrete planning to be undertaken to build and operate specific businesses to provide the required services. Also, knowing the types of businesses which are likely to be required and the sizes of them permits the Tribe to begin decision making and planning as to whether they should be built on or off the Reservation. This kind of detail also permits the Tribe to plan for possible imposition of taxes or other revenue generating techniques on

the specific types of businesses which would result. On the other hand, it provides much more detailed thinking and planning about the kinds and amounts of government services to be provided either by the Tribe or by state, county, or city governments. Another kind of detail which can be provided about total employment is occupational detail. This is useful in at least two ways: (1) it provides a better basis for estimating payroll income to be generated and hence the desirability from that point of view of the development, and (2) it provides information about the kinds of occupations for which training agencies and programs should be preparing the Northern Cheyenne labor force in order for them to participate in the economic benefits of the development.

It is hoped that these examples serve to illustrate the usefulness of the types of information impact analysis provides and of the increased usefulness available from more detail. It should be emphasized, however, that whenever more detail is added, the cost of producing the information increases. It thus becomes a question of balancing more useful information against the cost of getting it and deciding how much detail to pay for. For example, the Tribe may decide that it is willing to pay for a lot of detail about the Indian population in the area, but that it will settle for the total number of non-Indians with little or no age, sex, etc. detail about that group.

In thinking about this cost vs usefulness question, it is useful to keep two types of things in mind:

1. The total cost of an analytical system can be broken into two parts: the start up cost and the operation costs.

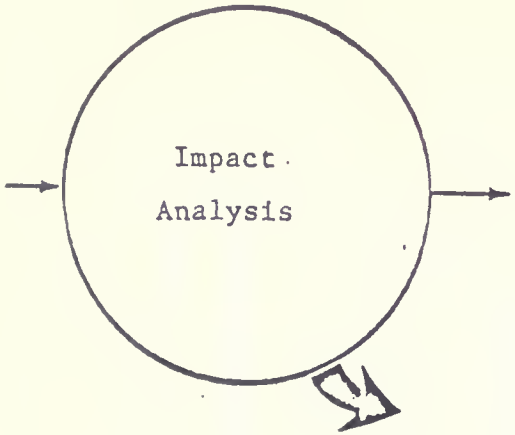
2. Both start up and operation costs will be significantly different depending upon whether the analysis is to be carried out by hand using desk top

calculations and work sheets and several trained analysts or implemented on a computer requiring fewer people, but also requiring more elaborate equipment.

These two considerations are closely interrelated. In general, start up costs tend to be lower with by-hand methods than with computer methods, but operating costs tend to be lower with computer methods. Also, computer methods tend to be quicker and less subject to error once they are operating properly.

It is too early to recommend a solution to these issues or to decide as to what types of information the Tribe wishes to have incorporated into the impact analysis methods being designed for permanent installation at the NCRP. The purpose of this paper is to stimulate discussion of the issues with the intent of reaching decisions about these issues as soon as possible.

To provide further suggestions for discussion, the NCRP economists are suggesting the following lists of types of information and levels of detail of them. This list is taken from the outline of a presentation which was to have been made to the new Tribal Council during its initiation meetings. Schedule changes prevented this presentation but the outline has been circulated and some Tribal members are familiar with it.



Note: Both the types of information named in this table and the level of detil at which the analysis is to be carried out (indicated in parentheses) put forth here are the suggestions of the NCRP economists. They are based on the approaches which have been found useful by state, local, and Tribal governments in other areas. The types of information and levels of detail finally included in the NCRP analysis should be chosen to meet the needs of the Northern Cheyenne people and their Tribal government. It is hoped that discussion of these suggestions can soon produce a final set of information categories. In this discussion, categories may be deleted from this list, others may be added, the suggested levels of detail may be adjusted, or any other type of change may be made. It is hoped that these difficult decisions can be made as soon as possible.

	Economic Impacts	Socio-cultural Impacts	Environmental Impacts
Direct Project Impacts	Employment by occupation Northern Cheyenne training requirements Additional labor force requirements Payroll incomes by occupation Tribal revenues from leases, royalties, etc.		
Indirect-Induced Impacts	Population (age, sex, race) Migration (age, sex, race) Commuting (age, sex, race) Employment (industry, occupation) Unemployment rate Income to individuals Revenue to Tribe Housing Requirements School age populations Public service requirements		

Appendix B.2.

Impact Analysis Methodology

Refers to: Chapter III.C.

This appendix presents a formal detailed description of the impact analysis design prepared as part of the proposed NCRP decision information system. A narrative presentation appears in Section D of Chapter III of this report. This appendix is organized into two parts: (1) a formal presentation of the impact projection methodology including both the demographic and the economic components, and (2) several sample calculations demonstrating the procedure in which parts of the economic component would be applied. Due to lateness of availability of certain data elements, these demonstrative examples cannot be presented as complete and final analyses. As surveys are completed, compiled and analysed, final application can be carried out and the methodology made fully operational and available for routine use as an economic impact projection capacity.

Full implementation and calibration of the demographic component has been completed, thus, it is not necessary to resort to examples here. Indian population projections utilizing the methodology described below and based upon various reasonable vital behavior assumptions are summarized in Chapter II and presented in detail in Appendix A.2. These represent "final" projections under the assumed vital rate projections and in the absence of employment induced migration.

I. Formal Statement of Demographic and Economic Projection Methodology

A. Demographic Component--Formal Statement

The methodology section in Chapter III of the Report briefly introduced the population projection technique developed for the Northern

Cheyenne Research Project. The purpose of this section of this appendix is to introduce and discuss the specific equational structure and interrelationships underlying the population projection techniques. The discussion will be centered around the following detailed conceptual flowchart and supported by the definitional listing of the relevant components of the technique and an equations list.

The elements in the flow chart are to be interpreted as follows. The boxes represent values of variables or parameters as named in the box. Square cornered boxes represent computed values while round cornered boxes represent parametric inputs used in the calculation routines. A diamond represents a conditional statement or question. Each box is labeled with a two-element symbol e.g., A-1 which serves to simplify identification of boxes in the narrative. The names of the variables and parameters are printed in capital letters with lower case letters in the boxes being used for sub- and superscripts. The superscript is used to identify the time for which each value is relevant. A "t" indicates the beginning of a five year projection period, a "t+5" indicates the end of that period. The subscripts identify the dimensions of the variable or parameter as follows:

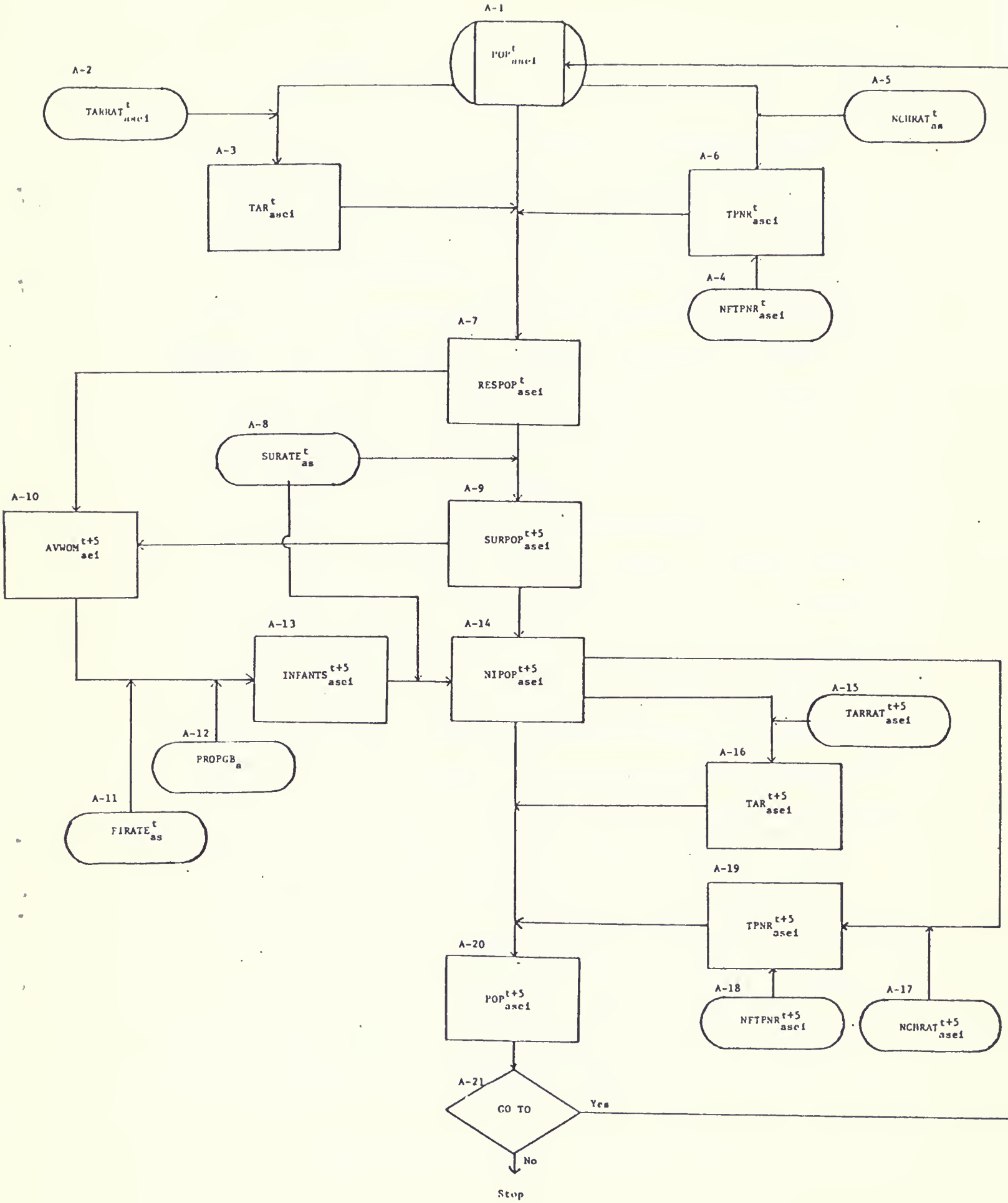
a = age (five year age group)

s = sex

e = ethnic group (Northern Cheyenne or Other Indian)

i = area (on Northern Cheyenne Reservation or Ashland-Mission Grounds off Reservation)

The arrows in the charts indicate conceptual interrelationships among variables and parameters. The mathematical expression of these


A-1
POP t aaei
A-2
TARRAT t aaei
A-3
TAR t aaei
A-4
NFTPNR t asei
A-5
NCHRAT t as
A-6
TPNR t asei
A-7
RESPOP t asei
A-8
SURATE t as
A-9
SURPOP t+5 asei
A-10
AVWOM t+5 aei
A-11
FIRATE t as
A-12
PROPGB a
A-13
INFANTS t+5 asei
A-14
NIPOP t+5 asei
A-15
TARRAT t+5 asei
A-16
TAR t+5 asei
A-17
NCHRAT t+5 asei
A-18
NFTPNR t+5 asei
A-19
TPNR t+5 asei
A-20
POP t+5 asei
A-21
GO TO
Yes
No
Stop

interrelationships can be found in the equations list following the narrative.

The population projection technique utilizes the first two components (births and deaths) of the three-component cohort survival technique and part of the third (the non-employment related component of migration). The technique is a refined version of the well established aging and surviving method of projection of the natural increase population (base year population plus births minus deaths). In this method, cohort-specific survival rates (the proportion of those alive in the base year age group expected to survive to the end of the projection period and be promoted to the next older age group) are applied to the initial population (disaggregation into the proper age group structure) to produce the aged and survived population. Cohort specific birth rates (number of live births over the projection period per woman in the child bearing ages) are then applied to the average number of women between "t" and "t+5" in the appropriate age groups to project the number of births. This number is assigned gender, then sex specific infant survival rates are applied to project the population in the youngest age group. The result is referred to as natural increase population. The described steps are illustrated in the flow chart and represented respectively in boxes A-7, A-8, A-9, A-7, A-10, A-11, A-12, A-13, A-8 and A-14. Note that the population is established in each area (i) by age (a), sex (s), and ethnic group (e), that the survival and birth rates required are five-year rates, and that all parameters can be adjusted through the projection period to derive the implications of possible future behavioral changes.* The NIPOP variable A-8 is the natural increase population.

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* See discussion in Data Development section of the appendix.

It is well established in the literature that the aging and surviving technique is unexceptionable if applied to a base year population consisting of the permanent population of the area, but that it can potentially produce erroneous results if it is applied to a base year population which consists of simple counts of those actually residing in an area at a given time. The errors which can be produced result from the fact that such a count will tend to undercount the true resident population by excluding those permanent residents who are temporarily residing elsewhere but can be expected to return by the end of the projection period. Similarly, such a count will tend to overcount by including those who are temporarily residing in the area but can be expected to relocate by the end of the projection period. Of course, it will never be possible to account for all such distortions; in cases where there is no systematic reason to expect secular changes in their level or directions, it is legitimate to ignore them in the expectation that realized net under- or overcounting at the end of the period will sufficiently resemble that at the beginning so that no significant variations from projected levels will be produced. If, on the other hand, there are systematic reasons to expect secular changes in levels and/or directions of these non-employment related migrations, adjustments to the aging and surviving technique should be attempted to incorporate such expected changes into the projection. Since calibration of the projection technique to a large extent relies on the 1976 Tribal Census, which is a simple count and thus subject to under- and overcounting, and since the possibility of systematic changes in non-employment related migration does exist, it is necessary

to use the herein described population projection procedure as a refined aging and surviving technique.

The refinements take the form of adjustments for gross (in and out) non-employment related migration to both base period population (POP, A-1) and the natural increase population (NIPOP, A-14). In the former, an estimate of those residents temporarily absent from an area (TAR, A-3) is produced by applying appropriate rates (TARRAT, A-2) to the population. The temporarily present non-resident, (TPNR, A-6) calculation is composed of two parts. The only case of temporarily present non-residents being dependent on the study area's population is when they are also temporarily absent from one of the study areas. The case considered deals with Reservation Northern Cheyenne residing at Northern Cheyenne Home in Ashland. For this case (NCHRAT, A-5) is applied to the population to produce part of (TPNR, A-6). The other part of (TPNR, A-6) is entered exogenously as the parameter labeled (NFTPNR, A-4). This represents the case in which TPNR's are temporarily absent from somewhere outside of the study area and therefore have no functional relationship to (POP, A-1). The algebraic sum of vectors POP plus TAR minus TPNR is the estimate of the permanent resident population (RESPOP, A-7) to which the aging, surviving and birthing procedure represented by boxes A-8, A-9, A-7, A-10, A-11, A-12, A-13, A-8, and A-14 is applied.

The NIPOP projection then, is also a permanent population type figure. To be converted to a projection of actual population in the area, it is necessary to, in effect, reverse the adjustment to POP discussed above. (TARRAT, A-15) is applied to (NIPOP, A-14) to calculate (TAR, A-16).

(NCHRAT, A-17) is applied to NIPOP to produce part one of (TPNR, A-19). Part two, (NFTPNR, A-18) is then added to part one to produce total (TPNR, A-19). The algebraic sum of NIPOP minus TAR plus TPNR then becomes the projection of population in the Census area (POP, A-20).

The discussion has described the process for projecting the population five years into the future. (Go to, A-21) asks the question should the population be projected an additional five years into the future. If the answer is yes, the described process is repeated as shown by the arrow with the calculated POP^{t+5} replacing POP^{t}. If the answer is no, the projection is complete.

Calculated Values (Variables

TAR
POSITION:* A-3, A-16
DEFINITION: Temporarily absent residents
DIMENSION: age, sex, ethnic group, area

TPNR
POSITION: A-6, A-19
DEFINITION: Temporarily present non-residents
DIMENSION: age, sex, ethnic group, area

RESPOP
POSITION: A-7
DEFINITION: Resident population
DIMENSION: age, sex, ethnic group, area

SURPOP
POSITION: A-9
DEFINITION: Survived resident population
DIMENSION: age, sex, ethnic group, area

AVWOM
POSITION: A-10
DEFINITION: Average women in the child bearing ages between t and t+5.
DIMENSION: age, ethnic group, area

INFANTS
POSITION: A-13
DEFINITION: Children born between t and t+5
DIMENSION: age, sex, ethnic group, area

NIPOP
POSITION: A-14
DEFINITION: Natural increase resident population
DIMENSION: age, sex, ethnic group, area

POP
POSITION: A-20
DEFINITION: Projected census equivalent population. Number of people expected to reside in the area at time t+5. Replaces POP, A-1 for subsequent five year projection.
DIMENSION: age, sex, ethnic group, area

Parameters

POP
POSITION: A-1
DEFINITION: Initial population in the area at time t estimated from the Summer/Fall, 1976 Northern Cheyenne Tribal Census.
DIMENSION: age, sex, ethnic group, area

---

* Indicates location of variable on the flow chart.

TARRAT
POSITION: A-2, A-15
DEFINITION: Temporarily absent residents rate
DIMENSION: age, sex, ethnic group, area

NFTPNR
POSITION: A-4, A-18
DEFINITION: Temporarily present non-residents with no functional relationship to the census area's population.
DIMENSION: age, sex, ethnic group, area

NCHRAT
POSITION: A-5, A-17
DEFINITION: People temporarily present at Northern Cheyenne Home.
DIMENSION: age, sex, ethnic group, area

SURATE
POSITION: A-8
DEFINITION: Five year survival rate
DIMENSION: age, sex

FIRATE
POSITION: A-11
DEFINITION: Five year fertility rate
DIMENSION: age, sex

PROPGB
POSITION: A-12
DEFINITION: Denotes proportions of infants who are born male or female
DIMENSION: sex

EQUATIONS LIST

Residentiary Adjustments at t

1. $TAR^{t}_{asei} = TARRAT^{t}_{asei} \times POP^{t}_{asei}$

2. $TPNR^{t}_{asei} - (NCHRAT^{t}_{asei} \times POP^{t}_{asei}) + NFTPNR^{t}_{asei}$

3. $RESPOP^{t}_{asei} = POP^{t}_{asei} + TAR^{t}_{asei} - TPNR^{t}_{asei}$

Natural Increase Adjustments at t+5

4. $SURPOP^{t+5}_{asei} = SURATE^{t}_{as} \times RESPOP^{t}_{asei}$

5. $$AVWOM^{t+5}_{aei} = \frac{\sum_{a=15}^{44} (RESPOP^{t}_{a,s=female,ei} + SURPOP^{t+5}_{a,s=female,ei})}{2}$$

6. $INFANTS^{t+5}_{asei} = (AVWOM^{t+5}_{aei} \times FIRATE^{t}_{as}) \times PROPGB_{s}$

7. $NIPOP^{t+5}_{asei} = (INFANTS^{t+5}_{asei} \times SURATE^{t}_{as}) + SURPOP^{t}_{asei}$

Non-Employment Related Migration Adjustments at t+5

8. $TAR^{t+5}_{asei} = TARRAT^{t+5}_{asei} \times NIPOP^{t+5}_{asei}$

9. $TPNR^{t+5}_{asei} = (NCHRAT^{t+5}_{asei} \times NIPOP^{t+5}_{asei}) + NFTPNR^{t+5}_{asei}$

10. $POP^{t+5}_{asei} = NIPOP^{t+5}_{asei} = TAR^{t+5}_{asei} + TPNR^{t+5}_{asei}$

B. Economic Component -- Formal Statement.

This section presents a detailed formal statement of the impact analysis methodology or "model" designed for projection of the potential economic impacts on the Northern Cheyenne Reservation of the various economic development projects which are possible in the future on or near the Reservation. This design is in the most preliminary stage of development of all work done in this project. It should be expected that both design completion and design revision would be completed during an implementation project.

This section is organized according to the following flowchart which is reproduced from Chapter III, Section C. Box (1), PROJECTED POPULATION FROM DEMOGRAPHIC PROJECTION METHODOLOGY, is simply the sex and five year age group specific Indian population projection from the demographic component as described in the preceding section plus the, assumed constant, total non-Indian population. Box (2), PROJECTION OF PERSONAL INCOME, will be discussed in conjunction with the job opportunity projections of Boxes (4) and (5).

Box (3), BEFORE MIGRATION LABOR FORCE: INDIAN -and- NON-INDIAN derives projected labor force before employment induced migration according to the following equations:

Equation (3) 1

$$LFI = \sum_{a} \sum_{s} (LFPRI_{as})\,(POPI_{as})$$

Equation (3) 2

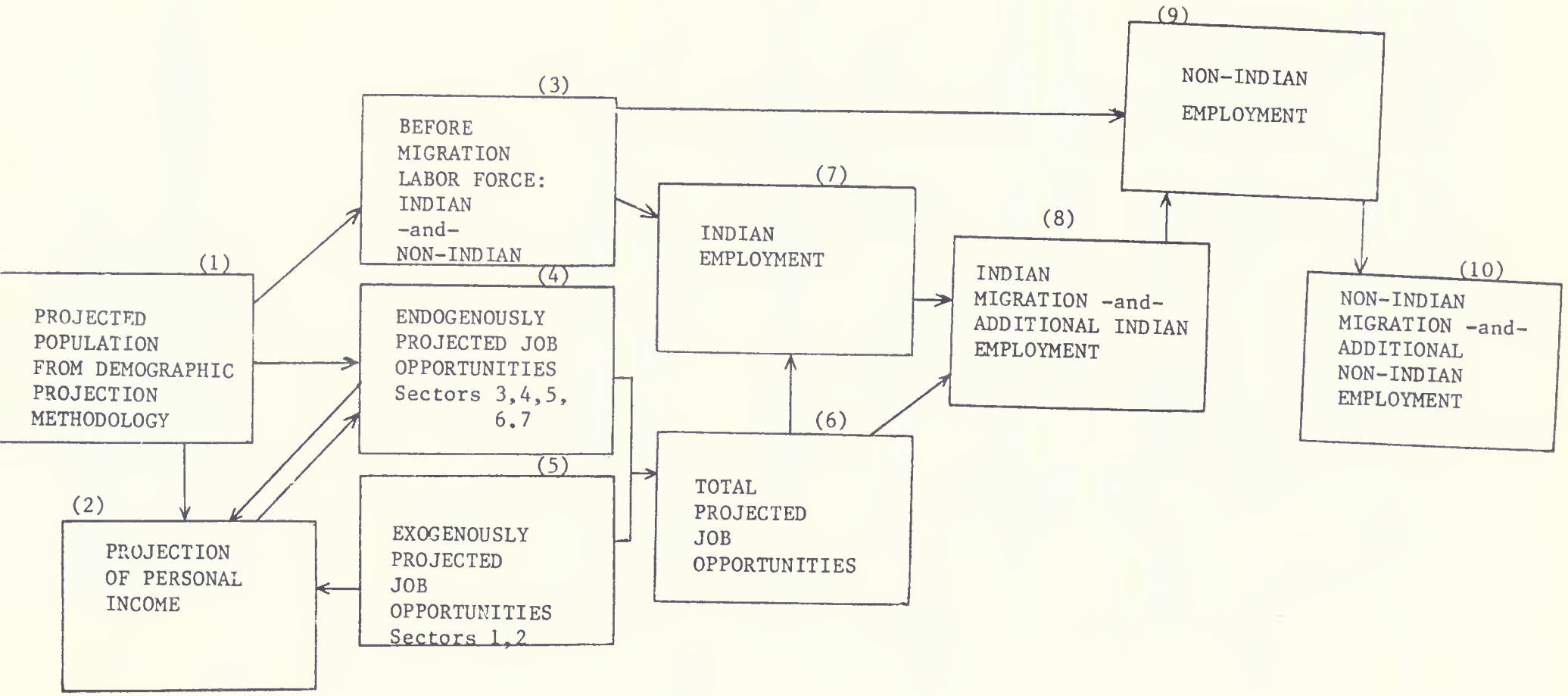
$$LFNI = (LFPRNI)(POPNI)$$

Where: LFI is Indian labor force,
LFPRI is Indian labor force participation rates,
POPI is Indian population projection from Box (1),
The "a" subscript denotes five year age groups,
The "s" subscript denotes sex,
LFNI is non-Indian labor force,
LFPRNI is non-Indian labor force participation rate,
POPNI is non-Indian population projection from Box (1)

IMPACT PROJECTION METHODOLOGY

ECONOMIC COMPONENT

FLOWCHART



Equation 3(3)

$$ESI = (LFI)(1+DJOBRI)$$

Equation 3(4)

$$ESNI = (LFNI)(1+DJOBRNI)$$

Where: ESI is Indian employment supply
DJOBRI is the Indian double job holding rate
ESNI is non-Indian employment supply
DJOBRNI is the non-Indian double job holding rate

The double job holding rates (DBJOBRI and DJOBRNI) are computed as the sum of the total jobs held minus the labor force divided by the labor force: $DBJOBR = \frac{\text{total jobs - labor force}}{\text{labor force}}$

Boxes (4) and (5), ENDOGENOUSLY PROJECTED JOB OPPORTUNITIES AND EXOGENOUSLY PROJECTED JOB OPPORTUNITIES, respectively, represent the procedure for projecting job opportunities and wage and salary earnings in each of the seven industrial sectors (earnings enter Box (2) as part of projected personal income):

1. Farming and Ranching
2. Minerals
3. Tribal Government
4. Schools
5. Federal Government
6. Construction
7. Other Private

The projection techniques for each sector are described below:

Sector 1: Farming and Ranching

As mentioned in the main body of the report, because virtually all of the products of this sector are exported, projections of farming employment and earnings will be produced exogenously.

Sector 2: Minerals

As with sector 1, this sector's products are for export. Projections for minerals will be produced exogenously.

Equation (4&5)1

$$EXPTGP_g = \max\left[\min, (MEXPTGP_g)(POPSTSV_g)\right] + EXPX_g$$

Where:

EXPTGP = Expenditures aimed directly for target population

MEXPTGP = Target population expenditure multiplier

$$MEXPTGP^t \equiv \left(\frac{EXPTGP_g^{1976}}{POPSTSV_g^{1976}}\right) (1+REXP)^T$$

POPSTSV = Agency target population

REXP = Rate which allows for growth or decline in expenditures due to changes in productivity

EXPX = Rate which allows for changes in policies toward amounts expended by an agency

g identifies agency of Tribal Government

t identifies future year

T is exponent whose value is the number of the projection interval ending at t.

Equation (4&5)2

$$EXPTGG_g = \max\left[\min_g, (MEXPTGG_g) * \sum_g (EXPTGP_g)\right] + EXPX_g$$

Where:

EXPTGG = Expenditures aimed at other agencies i.e. expenditures which indirectly serve a target population

MEXPTGG = Agency indirect expenditure multiplier

$$MEXPTGG^t \equiv \left(\frac{EXPTGG_g^{1976}}{\sum_g EXPTGP_g^{1976}}\right) (1+REXP)^T$$

Equation (4&5)3

$$EXPTG = \sum_{g} (EXPTGP_{g} + EXPTGG_{g})$$

Where:

EXPTG = Total Tribal government expenditures

Equation (4&5)4

$$ERNTG = (PERNTG)\ (EXPTG)$$

Where:

ERNTG = Total earnings (wage & salary) generated by the Tribal Government sector.

PERNTG = Percent of Tribal expenditures that are wages & salaries (earnings)

$$PERNTG \equiv \left(\frac{W\&STG^{1976}}{EXPTG^{1976}}\right)$$

W&STG = Tribal government wages & salaries

Equation (4&5)5

$$EMP_{3} = (MEMPTG)(ERNTG)$$

Where:

MEMPTG = Total Tribal government employment

MEMPTG = Employment over earnings multiplier

$$MEMPTG \equiv \left(\frac{EMPTG^{1976}}{ERNTG^{1976}}\right) \Big/ (1+RERN)^{T}$$

RERN = Rate which allows for growth or decline in employment due to productivity changes

Sector 4: Schools

Equation (4&5)6

$$EXPSP_g = \max \left[\min_g, (MEXPSP_g)(POPSTSV_g) \right] + EXPX_g$$

Where:

EXPSP = School expenditures

MEXPSP = Target population expenditure multiplier

$$MEXPSP \equiv \left(\frac{EXPSP_g^{1976}}{POPSTSU_g^{1976}} \right) (1+REXP)^T$$

POPSTSV = School target population

EXPX = Rate which allows for changes in policies toward amounts expended by schools

REXP = Rate which allows for growth or decline in expenditures due to changes in productivity

Equation (4&5)7

$$EXPS = \sum_g (EXPSP_g)$$

Where:

EXPX = Total school expenditures

Equation (4&5)8

$ERNS = (PERNS)(EXPS)$

Where:

ERNS = Total earnings (wage & salary) generated by schools

PERNS = Percent of school expenditures that go to wages and salaries (earnings)

$$PERNS \equiv \left(\frac{W\&SS^{1976}}{EXPS^{1976}} \right)$$

W&SS = School wages & salaries

Equation (4&5)9

$EMP_4 = (MEMPS)(ERNS)$

Where:

EMPS = Total school employment

MEMPS = Employment over earnings multiplier

$$MEMPS \equiv \left(\frac{EMPS^{1976}}{ERNS^{1976}} \right) \; / \; (1+RERN)^{T}$$

RERN = Rate which allows for growth or decline in employment due to changes in productivity

Sector 5: Federal Government

Equation (4&5)10

$$EXPOGP_g = \max\left[\min_g (MEXPOGP_g)(POPSTSU_g)\right] + EXPX_g$$

Where:

EXPOGP = Expenditures aimed directly for a target population

MEXPOGP = Target population expenditure multiplier

$$MEXPOGP \equiv \left(\frac{EXPOGP^{1976}}{POPSTSV^{1976}}\right) (1+RERN)^T$$

POPSTSV = Government agency target population

REXP = Rate which allows for growth or decline in expenditures due to changes in productivity

EXPX = Rate which allows for changes in policies toward amounts expended by an agency.

Equation (4&5)11

$$EXPOGG_g = \max\left[\min_g, (MEXPOGG) \times \sum_g (EXPOGP_g)\right] + EXPX_g$$

Where:

EXPOGG = Expenditures aimed at other agencies i.e. expenditures which indirectly serve a target population

MEXPOGG = Agency indrect expenditure multiplier

$$MEXPOGG \equiv \left(\frac{EXPOGG_g^{1976}}{\sum_g EXPOGG_g^{1976}}\right) (1+REXP)^T$$

Equation (4&5)12

$$EXPOG = \sum_g (EXPOGP_g + EXPOGG_g)$$

Where:

EXPOG = Total Federal Government Expenditures

Sector 6: Construction

Formal specification of the earnings and employment-job opportunities equations for this sector has not been completed as of this writing. As indicated in Chapter III., Section C., this formal specification will place heavy emphasis on exogenously projected activity levels. The implicit functional notation can be suggested:

$$EARN_6 = f(HSHLD, HSHLD\Delta, EARNX_6)$$

where: $EARN_6$ = projected construction sector earnings,
$HSHLD$ = projected number of households
$HSHLD\Delta$ = projected 5 year change in HSHLD
$EARNX_6$ = exogenously projected construction earnings

$$EMP_6 = f(EARN_6)$$

Sector 7: Other Private

Equation (4&5)15

$$EARN_7^t \left[\left(\frac{EARN_7^{t-5}}{(TOTPERSY^{t-5} - EARN_7^{t-5})} \right) * \left(\sum_{k \neq 7} ERN_k^t + TRANS^t + PROPY^t \right) \right]$$

where: $EARN_7^t$ = earnings in sector 7 at time t

$EARN_7^{t-5}$ = earnings in sector 7 at time t-5

$TOTPERSY^{t-5}$ = total personal income at time t-5

$EARN_k^t$ = earnings in all sectors at time t

$TRANS^t$ = transfer payments

$PROPY^t$ = property income

"7" = subscript for sector 7

"k" = subscript for all industry sectors

Equation (4&5)13

ERNOG = (PERNOG)(EXPOG)

Where:

ERNOG = Total earnings (wage & salary) generated by federal government sector

PERNOG = Percent of federal government expenditures that are wages & salaries (earnings)

$$PERNOG \equiv \left(\frac{W\&SOG^{1976}}{EXPOG^{1976}} \right)$$

W&SOG = Federal government wages and salaries

Equation (4&5)14

EMP_5 = (MEMPOG)(ERNOG)

Where:

EMPOG = Total federal government employment

MEMPOG = Employment over earnings multiplier

$$MEMPOG \equiv \left(\frac{EMPOG^{1976}}{ERNOG^{1976}} \right) / (1+RERN)^{T}$$

RERN = Rate which allows for growth or decline in employment due to changes in productivity

Equation (4&5)16

$$EMP_7^t = EARN_7^t * \left[\left(\frac{EMP_7}{W\&S_7} \right) / (1+RERN)^t \right]$$

where: EMP_7^t = employment in sector 7 at time t

$EARN_7^t$ = earnings in sector 7 at time t

EMP_7^{76} = employment in sector 7 in 1976

$W\&S_7^{76}$ = wage and salary in sector 7 in 1976

$RERN^t$ = rate which allows for growth or decline in expenditures due to productivity changes.

Box (2) projects personal income according to the following equations:

Equation (2)1

$$TOTEARN = \sum_k EARN_k \quad \text{from Boxes (4) and (5)}$$

where: TOTEARN = total personal income derived from gross wage and salary payments

EARN = sector specific earnings projections

"k" = subscript identifies industrial sector

Equation (2)2

$$PROPY = \left(\frac{PROPY}{TOTEARN} \right)^{1976} TOTEARN + PROPYX$$

where: PROPY = property income

PROPYX = exogenously projected property income

Equation (2)3

$$STABTR_p = \left(\frac{STABTR_p}{POPSV_p}\right)^{76} POPSV_p$$

where: STABTR = stable component of transfer payments

POPSV = population receiving STABTR

p = subscript identifying transfer program (pensions, social security, etc.)

As indicated, formalization and the inverse relationship between variable transfer payments and earnings has not been completed. The following implicit functional rotation is suggestive:

$$VARTR_q = f(POPSV_q \quad TOTEARN)$$

where: VARTR = variable component of transfer payments

POPSV = population receiving VARTR

TOTEARN = total earnings from Equation (2)1.

q = subscript identifies transfer program (AFDC, unemployment compensation, etc.)

Equation (2)4

$$TOTPERSY = TOTEARN + PROPY + \sum_p STABTR_p + \sum_q VARTR_q$$

where TOTPERSY = projected total personal income

Box (6) simply represents the sector specific total job opportunities produced by both exogenous and endogenous means as discussed above under Boxes (4) and (5).

Box (7), INDIAN EMPLOYMENT, allocates the Box (6) total sectoral job opportunities from Box (6).

Equation (7)1

$$INDJOBOP_k = (INDPROP_K)\ (EMP_k)$$

where: INDJOBOP = jobs available to Indians

INDPROP = proportion of total jobs available to Indians (first estimates of INDPROP can be produced from the 1976 Business and Government Agency Surveys)

EMP = employment from Box (6)

k = subscript identifies sector

Equation (7)2

$$INDEMP = \min\left(\sum_k INDJOBOP_k,\ \sum_k INDJOBOP_k = ESI\right)$$

where: INDEMP = Indian employment

ESI = Indian labor force adjusted for multiple job holding from Box (3)

If there is insufficient Indian labor force, i.e., if $\left(\sum_k INDJOBOP_k - ESI\right)$ is greater than zero, then INDIAN MIGRATION -and- ADDITIONAL INDIAN EMPLOYMENT as indicated by Box (8) may be expected. As indicated insufficient knowledge concerning this behavior exists at present to permit writing the required equations.

Box (9) next deals with employment of non-Indians from the total job opportunities of Box (6):

Equation (9)1

$$NIJOBOP = \sum_k EMP_k - INDEMP$$

where: NIJOBOP = jobs available to non-Indians

EMP = employment from Box (6)

INDEMP = Indian employment from Box (7) (if Box (8) were operational and additional Indian employment were projected, this would be included in INDEMP and subtracted from EMP to get NIJOBOP)

k = subscript identifies sector

Equation (9)2

$$NIEMP = \min(NIJOBOP, NIJOBOP - ESI)$$

where: NIEMP = non-Indian employment

ESI = non-Indian labor force adjusted for multiple job holding from Box (3)

If there is insufficient indigenous non-Indian labor force to take available jobs, non-Indian in migration and additional non-Indian employment is projected in Box (10).

Equation (10)1

$$EXNIJOB = \max(0, NIJOBOP - ESI)$$

where: EXNIJOB = excess non-Indian job opportunities
NIJOBOP = non-Indian job opportunities from Box (9)
ESI = non-Indian labor force adjusted for multiple job holding from Box (3).

Equation (10)2

$$NIMIG = (MULTNIM)(EXNIJOB)$$

where: NIMIG = non-Indian migration

MULTNIM = multiplier applied to EXNIJOB to project migration. MULTNI is to be calibrated to include additional migration required to meet additional residentiary employment demand.

Equation (10)3

ADNIJOB = (MMLTNIG)(NIMIG)

Where: ADNIJOB = additional non-Indian residentiary jobs

MMLTNIG = multiplier applied to NIMIG to project additional residentiary employment demand.

C.3. Economic Examples

The following pages are examples of the labor force and employment supply calculated for Indians and non-Indians. The Indian labor force participation rates are from the 1970 Census for all Montana Indians. The non-Indian labor force participation rates simulate rural Utah labor force participation rates. The double job holding rate utilized on each example is .06015. This is just an approximation for use in this demonstration. Actual labor force participation rates of Northern Cheyennes, other Indians, and non-Indians are available from the results of the NCRP surveys. The actual rates can be applied to the five-year age breakdowns provided by the Census, and to the five-year age breakdowns in the population projections prepared by Rho, to provide age specific labor force and employment supply calculations for 1975, 1980, 1985, and 1990.

Following labor supply examples, a hypothetical example of the complete Tribal Government component of the impact projection methodology is presented. This example is based entirely on hypothetical data and is intended to be illustrative only. It presents no information as to the real situation and projected conditions of the Northern Cheyenne Tribal Government.

Finally, three specific examples based on best current available data for parts of the Tribal Government, schools, and other government components were prepared for Tribal and NCRP use.

Table B.2.1.

NON-INDIAN LABOR FORCE CALCULATIONS

Labor Force Participation Rates

1975 - .5972
1980 - .6073
1985 - .6107
1990 - .6122

Non-Indian Base Population

1975 - 388
1980 - 388
1985 - 388
1990 - 388

Labor Force

1975 - 232
1980 - 236
1985 - 237
1990 - 238

Employment Supply

1975 - 246
1980 - 250
1985 - 251
1990 - 252

Non-Indian Base Population from 1976 Tribal Census

Table B.2.2.

Montana Indian Labor Force
Participation Rates

AGE	MALE LFPR	FEMALE LFPR
0-4	0	0
5-9	0	0
10-14	0	0
15-19	.281	.241
20-24	.652	.355
25-29	.771	.385
30-34	.771	.385
35-39	.833	.350
40-44	.833	.350
45-49	.619	.284
50-54	.619	.284
55-59	.619	.284
60-64	.619	.284
65-69	.197	.118
70-74	.197	.118
75+	.197	.118

Held constant for each projection period.

Table B.2.3

Indian Labor Force Calculations
(1976 Northern Cheyenne Tribal
Census Area)

	1975	1980	1985	1990
Indian Population	2616	2986	3415	3917
Labor Force Participation Rate	.25	.26	.27	.27
Labor Force	654	772	935	1061
Labor Supply	692	818	991	1125

Indian Population from 1976 Tribal Census and population projections prepared by Rho

Labor Force Participation Rates from 1970 Census data for all Montana Indians. Calculations were carried out on an age and sex specific basis. These detailed labor force participation rates were held constant at the level indicated in Table B.2.2. The changes in overall participation rates indicated in this table result from projected changes in the age distribution of the Indian Population; specifically, it is projected that over time a higher proportion of this population will be in the higher participation early adult age groups.

Labor Supply exceeds Labor Force by the amount of desired double (or multiple) job holding. A hypothetical double job holding rate is used here.

Tribal Government - Example

Note: <u>This example is for demonstration purposes only. It is based on hypothetical data.</u>

In this hypothetical example it is assumed that there are three agencies in the Tribal Government sector. Agencies A and B directly serve two different population groups. Agency A serves all Indians in the 1976 Tribal Census area ages 0 to 4 and agency B serves the entire Indian population in the Tribal Census area. Agency C indirectly serves the Indian population in the census area by providing services to agencies A and B.

All figures used in this example are fictitious with the exception of population which is derived from the Constant Vital Rate projection described in Appendix B3. Definitions of variables and parameters used may be found above in Section A of this appendix. A, B and C will be used as subscripts to identify the respective agencies.

Expenditure Projection

$$EXPTGP_g = \max\left[\min_g (MEXPTGP_g)(POPSTSV_g)\right] + EXPX_g$$

Agency A parameters	Agency B parameters
$EXPX_A = 0$	$EXPX_B = 0$
$REXP_A = 0$	$REXP_B = 0$
$EXPTGP_A^{1976} = \$300,000$	$EXPTGP_B^{1976} = \$500,000$
$POPSTSV_A^{1976} = 405$	$POPSTSV_B^{1976} = 2,839$
$POPSTSV_A^{1980} = 515$	$POPSTSV^{1980} = 2,986$
$POPSTSV_A^{1985} = 601$	$POPSTSV_B^{1985} = 3,415$
$POPSTSV_A^{1990} = 684$	$POPSTSV_B^{1990} = 3,917$
$MEXPTGP_A = \$741$	$MEXPTGP_B = \$176$

Agency C is not considered here because it serves people indirectly.

Note: This example is for demonstration purposes only. It is based on hypothetical data.

Projection of expenditures for Agency A.

$$EXPTGP_A^{1980} = \max\left[300000, (741)(515)\right] + 0$$

$$EXPTGP_A^{1980} = \$381,615$$

$$EXPTGP_A^{1985} = \$445,341$$

$$EXPTGP_A^{1990} = \$506,844$$

Projection of expenditure for Agency B.

$$EXPTGP_B^{1980} = \max\left[500000, (176)(2,986)\right] + 0$$

$$EXPTGP_B^{1980} = \$525,536$$

$$EXPTGP_B^{1985} = \$601,040$$

$$EXPTGP_B^{1990} = \$689,392$$

Indirect expenditures

$$EXPTGG_g = \max\left[\min_g(MEXPTGG_g) * \sum_g (EXPTGP_g)\right] + EXPX_g$$

Agency C parameters:

$$EXPX_C = 0$$

$$REXP_C = 0$$

$$EXPTGG = \$100,000$$

$$MEXPTGG_C = .125$$

Projection of expenditures for agency C:

$$EXPTGG_C^{1980} = \max\left[100,000, (.125) * (381,615 + 525,536)\right] + 0$$

$$EXPTGG_C^{1980} = \$113,394$$

$$EXPTGG_C^{1985} = \$130,798$$

$$EXPTGG_C^{1990} = \$149,529$$

Note: This example is for demonstration purposes only. It is based on hypothetical data.

Calculation of total Tribal Government Expenditures

$$EXPTG = \sum_{g} (EXPTGP_g + EXPTGG_g)$$

$$EXPTG^{1980} = (381,615 + 525,536) + (113,394)$$

$$EXPTG^{1980} = \$1,020,545$$

$$EXPTG^{1985} = \$1,177,179$$

$$EXPTG^{1990} = \$1,345,765$$

Calculation of earnings generated by Tribal Government

$$ERNTG = (PERNTG)(EXPTG)$$

Parameters:

$$W\&STG^{1976} = \$630,000$$

$$PERNTG = .7000$$

$$ERNTG^{1980} = (.700)(1,020,545)$$

$$ERNTG^{1980} = \$714,381$$

$$ERNTG^{1985} = \$824,025$$

$$ERNTG^{1990} = \$942,036$$

Calculation of Tribal Government Employment

$$EMP_g = (MEMPTG)(ERNTG)$$

Parameters:

$$RERN = 0$$

$$MEMPTG = .00015873$$

$$EMP^{1976} = 100$$

$$EMP^{1980} = (.00015873)(714,381)$$

$$EMP^{1980} = 113$$

$$EMP^{1985} = 131$$

$$EMP^{1990} = 150$$

Schools - Example

Note: This example is for demonstration purposes only. It is based on hypothetical data.

In this hypothetical example it is assumed that there are two schools in the 1976 Tribal Census area. School A includes grades kindergarten thru eighth grade and school B includes grades nine thru 12. Therefore school A's target population is Indians in the census area ages 5-14 and school B's target population is Indians in the census area ages 15-19.

All figures in the example are fictitious with the exception of population which is derived from the "Constant Vital Rate" projection described in Appendix B.3. Definitions of variables and parameters used may be found above in Section A of this appendix. ~~Subscripts~~ A and B will be used as subscripts to identify the respective schools.

Expenditure Projection

$$EXPSP_g = \max\left[\min_g, (MEXPSP_g)(POPSTSV_g)\right] + EXPX_g$$

School A parameters	School B parameters
$EXPX_A = 0$	$EXPX_B = 0$
$REXP_A = 0$	$REXP_B = 0$
$EXPSP_A^{1976} = \$1{,}000{,}000$	$EXPSP_B^{1976} = \$400{,}000$
$POPSTSV_A^{1976} = 884$	$POPSTSV_B^{1976} = 377$
$POPSTSV_A^{1980} = 993$	$POPSTSV_B^{1980} = 402$
$POPSTSV_A^{1985} = 1{,}090$	$POPSTSV_B^{1985} = 428$
$POPSTSV_A^{1990} = 1{,}249$	$POPSTSV_B^{1990} = 454$
$MEXPSP_A = \$1{,}131$	$MEXPSP_B = \$1{,}061$

Note: This example is for demonstration purposes only. It is based on hypothetical data.

Projection of expenditures for school A

$$EXPSP_A^{1980} = \max\left[1{,}000{,}000, (1{,}131)(993)\right] + 0$$

$$EXPSP_A^{1980} = \$1{,}123{,}083$$

$$EXPSP_A^{1985} = \$1{,}232{,}790$$

$$EXPSP_A^{1990} = \$1{,}412{,}619$$

Projection of expenditures for school B

$$EXPSP_B^{1980} = \max\left[400{,}000, (1{,}061)(402)\right] + 0$$

$$EXPSP_B^{1980} = \$426{,}522$$

$$EXPSP_B^{1985} = \$454{,}108$$

$$EXPSP_B^{1990} = \$481{,}694$$

Calculation of total school expenditures

$$EXPS = \sum_g (EXPSP_g)$$

$$EXPS^{1980} = (1{,}123{,}083 + 426{,}522)$$

$$EXPS^{1980} = \$1{,}549{,}605$$

$$EXPS^{1985} = \$1{,}686{,}898$$

$$EXPS^{1990} = \$1{,}894{,}313$$

Note: This example is for demonstration purposes only. It is based on hypothetical data.

Calculation of earnings generated by schools

$$ERNS = (PERNS)(EXPS)$$

Parameters:

$$W\&SS = \$910,000$$

$$PERNS = .6500$$

$$ERNS^{1980} = (.6500)(1,549,605)$$

$$ERNS^{1980} = \$1,007,243$$

$$ERNS^{1985} = 1,096,484$$

$$ERNS^{1990} = \$1,231,303$$

Calculation of school employment

$$EMP_g = (MEMPS)(ERNS)$$

Parameters:

$$RERN = 0$$

$$EMP^{1976} = 100$$

$$MEMPS = .0001098$$

$$EMP^{1980} = (.0001098)(1,007,243)$$

$$EMP^{1980} = 111$$

$$EMP^{1985} = 120$$

$$EMP^{1990} = 135$$

Appendix B.3.

NCRP Staff Economist Qualifications Memo

Refers to: Chapter III.E.

The Rho Corporation
A Nonprofit Research Corporation
447 East First South (801) 363-7405
Salt Lake City, Utah 84111

MEMO

To: Mr. Dick Monteau, Director, Northern Cheyenne Research Project

From: Rodger Weaver, Ross Reeve

Date: January 26, 1977

Subject: NCRP Staff Economist

I. Introduction

As part of its program to assist the Northern Cheyenne Tribe, through the Northern Cheyenne Research Project (NCRP), in developing its own economic and demographic research and analysis capacity, it will be necessary for The Rho Corporation to train a NCRP staff economist to carry out the required tasks. Mr. Dick Monteau, NCRP Director, has requested Rho to prepare an advisory statement concerning expected job duties, skills and abilities, educational and experience requirements, and probable time commitments. This document is submitted in response to this request for advice. It is hoped that Mr. Monteau will find this advice useful in weighing all relevant considerations concerning this issue.

In this introductory section, it may be appropriate to mention one characteristic which appears vital in the person filling this position: the ability to develop and maintain a close relationship with Tribal Council decision makers and especially to be able to disagree frankly and openly with important Tribal officials on economic analysis but not policy matters. It is likely, though not certain, that this requirement dictates that the employee be an enrolled Northern Cheyenne Tribal member.

II. Job Duties

The following constitute the duties which the NCRP staff economist would have to perform in utilizing the analytical capacities being designed by Rho. Of course, these duties are in addition to others she or he may be assigned which are not related to the Rho design.

1. Receipt and discussion of information-research-analysis requests from non-technician decision makers.

2. Select appropriate types and levels of impact and/or feasibility analyses and carry out these analyses as required.

3. Report on completed analyses and assist in deriving interpretations and implications from completed analyses for planning and decision making.

4. Maintain and update data series--both from local sources and primary research and from remote governmental and private sources.

5. Maintain familiarity with and develop critical evaluations of new literature relevant to Northern Cheyenne and Indian economic systems and problems and the relevant economics literature in general.

III. Required Abilities

The items listed here constitute the skills and abilities which must be developed over the first few years of employment in order to carry out the duties of the position as described above. The items on the list preceded by an asterisk (*) are viewed as minimum entry abilities.

* A. "Feel" for current and historical economic and demographic systems and conditions on the Northern Cheyenne Reservation and

relationships among the Reservation and surrounding communities and for how these might be altered by prospective economic development events.

B. Analytical Skills and Abilities

* 1. Ability to deal with formal logical processes.

* 2. Ability to use specified mathematical formulae as a major analytical tool.

3. Ability to recognize the reality of the economic system and the relationships between this reality and the mathematical formulae and data used as tools to analyse it--and especially the limitations of such tools.

4. Ability to select and modify appropriate analytical approaches for application to specific problems.

5. Ability to learn and to participate in development of new analytical techniques.

C. Data Maintainance and Collection Abilities

1. Ability to recognize analytical data needs.

* 2. Ability to develop and maintain familiarity with and routine access to private and governmental data sources.

* 3. Ability to participate in design, administration, and analysis of primary data gathering research projects.

D. Communications Skills and Abilities

Placing this general category last in the list does not imply low priority. It is essential, if the work of the staff economist is to be useful to Tribal planning and decision making, that the person in

the position be able to communicate effectively with Tribal members, and especially Tribal officials, who are not economic technicians.

* 1. Ability to perceive the nature of technical analytical problems from communication with non-technicians.
* 2. Ability to communicate results of research and analysis to non-technician decision makers.

IV. Education and Experience

The abilities listed above are the real areas of interest in selecting the NCRP staff economist. The suggested educational and experience qualifications discussed here should be viewed only as indicators of the possession of those abilities by job candidates. If other indications and impressions are that a candidate possesses the required abilities but he or she does not meet the educational and experience levels suggested here, those other indications and impressions should weigh heavily in the hiring decision.

A. Education

Bachelors degree or significant progress toward it in a major area which uses mathematical and numerical tools as basic analytical techniques. Such majors would include, but not be limited to: economics, statistics, mathematics, finance, management, etc. Possession of or substantial work toward completion of an advanced degree in a relevant major would also be extremely desirable.

B. Work Experience

Experience in a position requiring manipulation of data would be useful, especially if this involved selection among a set of techniques

for such manipulation based upon the nature of a specific task to be accomplished.

V. Time Commitments

It is expected that the time requirements for the components of the NCRP staff economist position described here would range between one 3/4 time position and one full time position complemented by a part time assistant. Of course, a larger commitment should be expected to produce higher quality analyses and, especially, quicker response to information requests.

Regardless of the size of the commitment, it must be recognized that work of this sort is usually "lumpy" in terms of time requirements; i.e., that there will be periods of significant over time alternating with slack periods when probably less than full time commitments will be needed. This feature of the work should be kept in mind by the NCRP and job candidate in making the hiring decision.

Appendix C

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C.1. 1970 Second Count Summary Tape - File B table of contents

C.2. 1970 Fourth Count Summary Tape (Population) - File B table of contents

C.3. 1970 Fourth Count Summary Tape (Housing) - File B - table of contents

C.4. Summary of 1970 Census Subject Report - American Indians PC(2)-1F

C.5. BEA Employment for Rosebud and Big Horn Counties

C.6. BEA Earnings for Rosebud and Big Horn Counties

C.7. County Profiles for Rosebud and Big Horn Counties

Appendix C.1.

1970 Second Count Summary Tape - File B

Table of Contents

Refers to: Chapter IV.B.

2nd Count - 9

1970 Second-Count Summary Tape

Table of Contents

Tabulation Number	Title
1	RACE AND SEX
2	SINGLE YEARS OF AGE, RACE AND SEX
3	HOUSEHOLD POPULATION BY AGE, RACE AND SEX
4	RELATIONSHIP AND RACE
5	POPULATION 14 YEARS OLD AND OVER BY MARITAL STATUS, AGE RACE AND SEX
6	POPULATION 6 TO 17 YEARS OLD BY RELATIONSHIP, FAMILY TYPE AND RACE
7	POPULATION UNDER 6 YEARS OLD BY RELATIONSHIP, FAMILY TYPE AND RACE
8	POPULATION 65 YEARS OLD AND OVER BY RELATIONSHIP AND RACE
9	HOUSEHOLDS BY TYPE, PRESENCE OF OWN CHILDREN UNDER 18, AGE AND RACE OF HEAD
10	FAMILIES BY TYPE, PRESENCE OF FAMILY MEMBERS UNDER 18 YEARS AND 65 YEARS AND OVER, AND RACE OF HEAD
11	POPULATION SUBSTITUTED
12	POPULATION WITH ONE OR MORE ALLOCATIONS
13	ITEMS ALLOCATED
14	RELATIONSHIP BEFORE AND AFTER SUBSTITUTION
15	SEX BEFORE AND AFTER SUBSTITUTION
16	RACE BEFORE AND AFTER SUBSTITUTION
17	AGE BEFORE AND AFTER SUBSTITUTION
18	MARITAL STATUS BEFORE AND AFTER SUBSTITUTION
19	RELATIONSHIP ALLOCATIONS BY TYPE
20	SEX ALLOCATIONS BY TYPE
21	RACE ALLOCATIONS BY TYPE
22	AGE ALLOCATIONS BY TYPE
23	MARITAL STATUS ALLOCATIONS BY TYPE
24	POPULATION WITH ALLOCATIONS BY QUESTIONS ALLOCATED
25	AGGREGATE $ VALUE
26	AGGREGATE $ MONTHLY CONTRACT RENT
27	AGGREGATE $ VALUE FOR UNITS WITH ALL PLUMBING FACILITIES
28	AGGREGATE $ MONTHLY CONTRACT RENT FOR UNITS WITH ALL PLUMBING FACILITIES
29	YEAR-ROUND/SEASONAL AND MIGRATORY STATUS
30	OCCUPANCY/VACANCY STATUS
31	TENURE AND RACE OF HEAD
32	PERSONS IN UNIT, TENURE AND RACE OF HEAD
33	HOUSEHOLDS BY TYPE, AGE OF HEAD, TENURE; RACE OF HEAD

Table of Contents (Continued)

Tabulation Number	Title
34	UNITS WITH NONRELATIVES BY HOUSEHOLD TYPE, TENURE; RACE OF HEAD
35	PERSONS PER ROOM, TENURE AND RACE OF HEAD
36	COMPLETE KITCHEN FACILITIES, TENURE; RACE OF HEAD
37	ACCESS AND COMPLETE KITCHEN FACILITIES, TENURE; RACE OF HEAD
38	TYPE OF STRUCTURE
39	WATER SUPPLY, TENURE; RACE OF HEAD
40	TOILET FACILITIES, TENURE; RACE OF HEAD
41	BATHING FACILITIES, TENURE; RACE OF HEAD
42	ROOMS IN UNIT
43	BASEMENT AND TYPE OF STRUCTURE
44	NUMBER OF UNITS AT ADDRESS AND TENURE
45	TELEPHONE AVAILABLE, TENURE; RACE OF HEAD
46	VALUE
47	MONTHLY CONTRACT RENT
48	DURATION OF VACANCY AND VACANCY STATUS
49	UNITS WITH ROOMERS, BOARDERS, OR LODGERS BY TENURE; RACE OF HEAD
50	PLUMBING FACILITIES
51	UNITS WITH 1.01 OR MORE PERSONS PER ROOM BY PLUMBING FACILITIES, TENURE AND RACE OF HEAD
52	VALUE FOR UNITS WITH ALL PLUMBING FACILITIES
53	MONTHLY CONTRACT RENT FOR UNITS WITH ALL PLUMBING FACILITIES
54	ACCESS AND KITCHEN FACILITIES FOR UNITS WITH ALL PLUMBING FACILITIES BY TENURE AND RACE OF HEAD
55	NUMBER OF PERSONS IN UNIT, NUMBER OF ROOMS, TENURE; RACE OF HEAD
56	TYPE OF HOUSEHOLD, AGE OF HEAD, NUMBER OF ROOMS, TENURE; RACE OF HEAD
57	VALUE, TYPE OF HOUSEHOLD, AGE AND RACE OF HEAD
58	VALUE, NUMBER OF ROOMS AND RACE OF HEAD
59	MONTHLY CONTRACT RENT, TYPE OF HOUSEHOLD, AGE AND RACE OF HEAD
60	MONTHLY CONTRACT RENT, NUMBER OF ROOMS AND RACE OF HEAD
61	PLUMBING FACILITIES, NUMBER OF ROOMS, TENURE; RACE OF HEAD
62	PLUMBING FACILITIES, NUMBER OF PERSONS IN UNIT, TENURE; RACE OF HEAD
63	PLUMBING FACILITIES, TYPE OF HOUSEHOLD, AGE OF HEAD, TENURE; RACE OF HEAD
64	UNITS WITH 1.01 OR MORE PERSONS PER ROOM BY PLUMBING FACILITIES, TYPE OF HOUSEHOLD, AGE OF HEAD, TENURE; RACE OF HEAD
65	UNITS WITH 1.01 OR MORE PERSONS PER ROOM BY PLUMBING FACILITIES, VALUE AND RACE OF HEAD
66	UNITS WITH 1.01 OR MORE PERSONS PER ROOM BY PLUMBING FACILITIES, MONTHLY CONTRACT RENT AND RACE OF HEAD

Table of Contents (Continued)

Tabulation Number	Title
67	VACANT-FOR-SALE ONLY UNITS BY NUMBER OF ROOMS AND SALE PRICE
68	VACANT-FOR-SALE ONLY UNITS BY DURATION OF VACANCY AND SALE PRICE
69	VACANT-FOR-SALE ONLY UNITS BY NUMBER OF ROOMS AND PLUMBING FACILITIES
70	VACANT-FOR-RENT UNITS BY NUMBER OF ROOMS AND ASKING RENT
71	VACANT-FOR-RENT UNITS BY DURATION OF VACANCY AND ASKING RENT
72	VACANT-FOR-RENT UNITS BY NUMBER OF ROOMS AND PLUMBING FACILITIES
73	POPULATION IN UNITS WITH 1.51 OR MORE PERSONS PER ROOM, BY SELECTED AGE CLASSES, TENURE; RACE OF HEAD
74	POPULATION IN UNITS BY SELECTED AGE CLASSES, PLUMBING FACILITIES, TENURE; RACE OF HEAD
75	POPULATION IN UNITS WITH 1.01 OR MORE PERSONS PER ROOM BY SELECTED AGE CLASSES, PLUMBING FACILITIES, TENURE; RACE OF HEAD
76	POPULATION IN UNITS WITH 1.01 OR MORE PERSONS PER ROOM BY TENURE AND RACE OF HEAD
77	PLUMBING FACILITIES, NUMBER OF PERSONS PER ROOM, TENURE AND RACE OF HEAD
78	ALLOCATIONS FOR TELEPHONE AVAILABLE
79	ALLOCATIONS FOR ACCESS
80	ALLOCATIONS FOR COMPLETE KITCHEN FACILITIES
81	ALLOCATIONS FOR ROOMS IN UNIT
82	ALLOCATIONS FOR WATER SUPPLY
83	ALLOCATIONS FOR TOILET FACILITIES
84	ALLOCATIONS FOR BATHING FACILITIES
85	ALLOCATIONS FOR TYPE OF FOUNDATION
86	ALLOCATIONS FOR TENURE
87	ALLOCATIONS FOR TYPE OF STRUCTURE
88	ALLOCATIONS FOR USE OF PROPERTY
89	ALLOCATIONS FOR VALUE
90	ALLOCATIONS FOR MONTHLY CONTRACT RENT
91	ALLOCATIONS FOR UNITS AT ADDRESS
92	ALLOCATIONS FOR VACANCY STATUS
93	ALLOCATIONS FOR DURATION OF VACANCY

Appendix C.2.

1970 Fourth Count Summary Tape (Population) - File B

Table of Contents

Refers to: Chapter IV.B.

1970 Fourth Count Summary Tape (Population)

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Tabulation Number	
1	AGGREGATE $ FAMILY INCOME OF FAMILIES *
2	AGGREGATE $ FAMILY INCOME OF FAMILIES WITH FEMALE HEAD
3	AGGREGATE $ INCOME OF UNRELATED INDIVIDUALS 14 YEARS OLD AND OVER
4	AGGREGATE $ INCOME OF FEMALE UNRELATED INDIVIDUALS
5	AGGREGATE $ INCOME OF POPULATION 14 YEARS OLD AND OVER BY SEX
6	AGGREGATE $ EARNINGS OF MALES 16 YEARS OLD AND OVER IN THE EXPERIENCED CIVILIAN LABOR FORCE BY SELECTED OCCUPATIONS
7	AGGREGATE $ EARNINGS OF FEMALES 16 YEARS OLD AND OVER IN THE EXPERIENCED CIVILIAN LABOR FORCE BY SELECTED OCCUPATIONS
8	AGGREGATE $ INCOME BY TYPE FOR FAMILIES AND UNRELATED INDIVIDUALS
9	AGGREGATE $ INCOME BY TYPE AND SEX
10	AGGREGATE $ INCOME DEFICIT FOR FAMILIES BELOW POVERTY LEVEL
11	AGGREGATE $ INCOME DEFICIT FOR UNRELATED INDIVIDUALS 14 YEARS OLD AND OVER BELOW POVERTY LEVEL
12	AGGREGATE $ INCOME OF SPECIFIED TYPES RECEIVED BY FAMILIES BELOW POVERTY LEVEL
13	AGGREGATE $ INCOME OF SPECIFIED TYPES RECEIVED BY UNRELATED INDIVIDUALS BELOW POVERTY LEVEL
14	AGGREGATE $ VALUE OF OWNER-OCCUPIED UNITS BY POVERTY STATUS OF FAMILY OR PRIMARY INDIVIDUAL
15	AGGREGATE $ GROSS RENT OF RENTER-OCCUPIED UNITS BY POVERTY STATUS OF FAMILY OR PRIMARY INDIVIDUAL
16	AGGREGATE $ INCOME DEFICIT BETWEEN SPECIFIED POVERTY LEVEL AND TOTAL INCOME FOR FAMILIES AND UNRELATED INDIVIDUALS
17	AGE AND SEX
18	RELATIONSHIP AND SEX
19	FAMILIES BY TYPE, PRESENCE AND AGE OF OWN CHILDREN
20	POPULATION 14 YEARS OLD AND OVER BY MARITAL STATUS AND SEX
21	NATIVITY AND PARENTAGE (15%)
22	COUNTRY OF ORIGIN AND NATIVITY (15%)
23	MOTHER TONGUE AND NATIVITY (15%)
24	SPANISH INDICATORS
25	CITIZENSHIP AND AGE (5%)
26	YEAR OF IMMIGRATION FOR THE FOREIGN-BORN POPULATION (5%)
27	STATE OF BIRTH FOR THE NATIVE POPULATION
28	POPULATION 5 YEARS OLD AND OVER BY RESIDENCE IN 1965 (15%)
29	POPULATION 5 YEARS OLD AND OVER LIVING IN SMSA'S OR ADJACENT TRACTS BY RESIDENCE IN 1965 (15%)
30	POPULATION LIVING IN A DIFFERENT COUNTY BY RESIDENCE AND ACTIVITY STATUS IN 1965 (15%)
31	POPULATION IN ARMED FORCES IN 1970 AND LIVING IN A DIFFERENT COUNTY BY RESIDENCE IN 1965 (15%)
32	INMATES OF INSTITUTIONS IN 1970 AND LIVING IN A DIFFERENT COUNTY BY RESIDENCE IN 1965 (15%)
33	POPULATION ATTENDING COLLEGE IN 1970 AND LIVING IN A DIFFERENT COUNTY BY RESIDENCE IN 1965 AND RESIDENCE WITH PARENTS IN 1970 (15%)
34	YEAR MOVED INTO UNIT (15%)
35	POPULATION AT WORK DURING THE CENSUS WEEK BY PLACE OF WORK (15%)
36	POPULATION AT WORK DURING THE CENSUS WEEK BY MEANS OF TRANSPORTATION TO WORK (15%)

4th Count (Pop.) - 13

Table of Contents (Continued)

Tabulation Number	Title
37	CIVILIAN MALES 16 YEARS OLD AND OVER BY VETERAN STATUS (15%)
38	POPULATION 3 YEARS OLD AND OVER ENROLLED IN SCHOOL BY LEVEL AND TYPE OF SCHOOL (15%)
39	POPULATION 3-34 YEARS OLD ENROLLED IN SCHOOL BY AGE (15%)
40	POPULATION 18-24 YEARS OLD BY COMPLETION OF HIGH SCHOOL AND COLLEGE
41	POPULATION 16-21 YEARS OLD NOT ENROLLED IN SCHOOL BY YEARS OF SCHOOL COMPLETED, EMPLOYMENT STATUS, AND SEX
42	POPULATION 25 YEARS OLD AND OVER BY YEARS OF SCHOOL COMPLETED AND SEX
43	POPULATION 16-64 YEARS OLD WITH LESS THAN 3 YEARS OF COLLEGE COMPLETED BY VOCATIONAL TRAINING AND SEX (5%)
44	FEMALES 15-44 YEARS OLD BY MARITAL STATUS, NUMBER OF CHILDREN, AND AGE
45	FAMILIES BY PRESENCE OF SONS/DAUGHTERS OF SELECTED AGE LEVELS
46	SUBFAMILIES BY SUBFAMILY TYPE AND NUMBER OF OWN CHILDREN UNDER 18 YEARS OLD
47	MARRIED COUPLES BY SUBFAMILY MEMBERSHIP
48	MARRIED COUPLES BY PRESENCE AND AGE OF OWN CHILDREN AND AGE OF HUSBAND
49	POPULATION UNDER 18 YEARS OLD BY RESIDENCE WITH PARENTS
50	EVER MARRIED POPULATION 14-54 YEARS OLD BY MARITAL HISTORY (5%)
51	POPULATION IN GROUP QUARTERS BY TYPE OF GROUP QUARTERS
52	POPULATION 16-64 YEARS OLD NOT INMATES AND NOT ATTENDING SCHOOL BY DISABILITY, EMPLOYMENT STATUS, AND SEX (5%)
53	MALES 20-49 YEARS OLD AND FEMALES 15-44 YEARS OLD BY YEARS OF SCHOOL COMPLETED
54	POPULATION 16 YEARS OLD AND OVER BY LABOR FORCE STATUS, SELECTED CHARACTERISTICS, AND SEX
55	POPULATION 16 YEARS OLD AND OVER IN THE LABOR FORCE BY AGE AND SEX
56	POPULATION 14-15 YEARS OLD BY LABOR FORCE STATUS AND SEX
57	PRESENCE AND AGE OF OWN CHILDREN UNDER 18 AND LABOR FORCE STATUS OF FEMALES 16 YEARS OLD AND OVER BY MARITAL STATUS
58	EMPLOYED POPULATION 16 YEARS OLD AND OVER BY OCCUPATION
59	EMPLOYED FEMALES 16 YEARS OLD AND OVER BY OCCUPATION
60	EMPLOYED MALES 14-15 YEARS OLD BY OCCUPATION
61	EMPLOYED FEMALES 14-15 YEARS OLD BY OCCUPATION
62	EMPLOYED POPULATION 16 YEARS OLD AND OVER BY INDUSTRY AND SEX
63	EMPLOYED POPULATION 14-15 YEARS OLD BY INDUSTRY AND SEX
64	MALES 16 YEARS OLD AND OVER BY WEEKS WORKED IN 1969 AND AGE
65	FEMALES 16 YEARS OLD AND OVER BY WEEKS WORKED IN 1969 AND AGE
66	POPULATION 14-15 YEARS OLD BY WEEKS WORKED IN 1969
67	EMPLOYED POPULATION 16 YEARS OLD AND OVER BY INDUSTRY, CLASS OF WORKER, AND SEX
68	EMPLOYED POPULATION 14 YEARS OLD AND OVER BY OCCUPATION AND SEX
69	EMPLOYED POPULATION 14 YEARS OLD AND OVER BY INDUSTRY AND SEX
70	EXPERIENCED UNEMPLOYED POPULATION 16 YEARS OLD AND OVER BY OCCUPATION AND SEX
71	POPULATION 14-15 YEARS OLD WHO WORKED IN 1969 BY OCCUPATION AND SEX
72	MALES 30-49 YEARS OLD BY WORK STATUS IN 1965 AND 1970
73	FEMALES 21-49 YEARS OLD WITH NO OWN CHILDREN 5-10 YEARS OLD BY WORK STATUS IN 1965, IN 1970, AND PRESENCE OF OWN CHILDREN UNDER 5 YEARS
74	FEMALES 21-49 YEARS OLD WITH OWN CHILDREN 6-10 YEARS OLD AND NO CHILDREN UNDER 6
75	FAMILY INCOME

Table of Contents (Continued)

Tabulation Number	Title
76	INCOME OF UNRELATED INDIVIDUALS
77	POPULATION 14 YEARS OLD AND OVER BY INCOME AND SEX
78	MALES 16 YEARS OLD AND OVER IN THE EXPERIENCED CIVILIAN LABOR FORCE BY EARNINGS AND OCCUPATION
79	FEMALES 16 YEARS OLD AND OVER IN THE EXPERIENCED CIVILIAN LABOR FORCE BY EARNINGS AND OCCUPATION
80	TYPE OF INCOME AND FAMILY STATUS
81	TYPE OF INCOME AND SEX
82	RATIO OF FAMILY INCOME TO POVERTY LEVEL
83	AGGREGATE NUMBER OF PERSONS IN FAMILIES BELOW POVERTY LEVEL
84	FAMILIES BY PRESENCE OF RELATED CHILDREN UNDER 18, TYPE OF FAMILY, AND POVERTY STATUS
85	RELATED CHILDREN UNDER 18 BY TYPE OF FAMILY, POVERTY STATUS, AND AGE
86	FAMILY HEADS 65 YEARS OLD AND OVER BY POVERTY STATUS
87	CIVILIAN MALE FAMILY HEADS 14-64 YEARS OLD BY LABOR FORCE AND POVERTY STATUS
88	FEMALE FAMILY HEADS IN THE LABOR FORCE WITH RELATED CHILDREN UNDER 6 YEARS OLD BY POVERTY STATUS
89	UNRELATED INDIVIDUALS BY AGE AND POVERTY STATUS
90	POPULATION 65 YEARS OLD AND OVER BY POVERTY STATUS
91	RELATED CHILDREN 5-17 YEARS OLD IN FAMILIES WITH INCOMES BELOW $3,000
92	RELATED CHILDREN UNDER 18 YEARS OLD IN FAMILIES BELOW POVERTY LEVEL BY PRESENCE OF PARENTS
93	POPULATION RECEIVING SOCIAL SECURITY OR RAILROAD RETIREMENT BY AGE AND POVERTY STATUS
94	NUMBER OF FAMILIES BELOW POVERTY LEVEL RECEIVING INCOME OF SELECTED TYPES
95	NUMBER OF UNRELATED INDIVIDUALS BELOW POVERTY LEVEL RECEIVING INCOME OF SELECTED TYPES
96	FAMILIES AND PRIMARY INDIVIDUALS IN HOUSING UNITS BY TENURE AND POVERTY STATUS
97	FAMILIES AND PRIMARY INDIVIDUALS IN HOUSING UNITS LACKING ONE OR MORE PLUMBING FACILITIES BY POVERTY STATUS
98	SPECIFIED POVERTY LEVEL, TYPE OF FAMILY, AND SELECTED FAMILY STATUS
99	SPECIFIED POVERTY LEVEL AND AGE
100	COUNT OF PERSONS SUBSTITUTED PLUS PERSONS WITH LESS THAN TWO SAMPLE CHARACTERISTICS REPORTED
101	POPULATION ALLOCATIONS AND SUBSTITUTIONS
102	COUNT OF HOUSEHOLDS SUBSTITUTED
103	FARM RESIDENCE
104	SEX
105	RACE
106	AGE
107	NATIVITY
108	NATIVITY OF PARENTS (15%)
109	YEAR MOVED INTO UNIT (15%)
110	RELATIONSHIP
111	POPULATION 14 YEARS OLD AND OVER BY MARITAL STATUS
112	POPULATION 3-34 YEARS OLD BY ENROLLMENT STATUS AND AGE (15%)
113	POPULATION 3-34 YEARS OLD ENROLLED IN SCHOOL BY LEVEL OF SCHOOL (15%)
114	POPULATION 25 YEARS OLD AND OVER BY YEARS OF SCHOOL COMPLETED
115	POPULATION 16 YEARS OLD AND OVER BY EMPLOYMENT STATUS

Appendix C.3.

1970 Fourth Count Summary Tape (Housing) - File B

Table of Contents

Refers to: Chapter IV.B.

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Tabulation Number	Title
116	EMPLOYED POPULATION 16 YEARS OLD AND OVER BY OCCUPATION
117	EMPLOYED POPULATION 16 YEARS OLD AND OVER BY INDUSTRY
118	POPULATION 16 YEARS OLD AND OVER BY WEEKS WORKED IN 1969
119	POPULATION 16 YEARS OLD AND OVER BY CLASS OF WORKER
120	POPULATION 14 YEARS OLD AND OVER BY INCOME AND SEX
121	FAMILIES AND UNRELATED INDIVIDUALS BY INCOME
122	POPULATION 14 YEARS OLD AND OVER BY INCOME STATUS, TYPE OF INCOME, AND SEX
123	POPULATION 14 YEARS OLD AND OVER BY AGGREGATE INCOME AND SEX
124	UNWEIGHTED SAMPLE POPULATION COUNT
125	UNWEIGHTED SAMPLE HOUSING COUNT
126	100% POPULATION COUNT
127	100% HOUSING COUNT

*All tabulations not otherwise indicated represent 20% Sample. Those indicated as 20% tabulations for Spanish Americans are tabulated on a 15% basis.

1970 Fourth-Count Summary Tape (Sample)

Table of Contents

Tabulation Number	Title
1	AGGREGATE $ VALUE
2	AGGREGATE $ VALUE FOR UNITS WITH ALL PLUMBING FACILITIES
3	AGGREGATE $ MONTHLY CONTRACT RENT
4	AGGREGATE $ MONTHLY CONTRACT RENT FOR UNITS WITH ALL PLUMBING FACILITIES
5	AGGREGATE $ GROSS RENT FOR RENTER-OCCUPIED UNITS
6	AGGREGATE $ ASKING RENT FOR VACANT YEAR-ROUND UNITS
7	TOTAL HOUSING UNITS
8	YEAR STRUCTURE BUILT, TENURE, AND RACE OF HEAD
9	UNITS IN STRUCTURE, TENURE, AND RACE OF HEAD
10	YEAR HEAD OF HOUSEHOLD MOVED INTO UNIT, TENURE, AND RACE OF HEAD (15%)
11	HEATING EQUIPMENT, TENURE, AND RACE OF HEAD
12	HEATING EQUIPMENT FOR UNITS WITH ALL PLUMBING FACILITIES BY TENURE AND RACE OF HEAD
13	HEATING EQUIPMENT FOR UNITS WITH ALL PLUMBING FACILITIES AND WITH BOTH DIRECT ACCESS AND COMPLETE KITCHEN FACILITIES BY TENURE AND RACE OF HEAD
14	SOURCE OF WATER, TENURE; RACE OF HEAD (15%)
15	TYPE OF SEWAGE DISPOSAL, TENURE; RACE OF HEAD (15%)
16	NUMBER OF BATHROOMS, TENURE, AND RACE OF HEAD (15%)
17	NUMBER OF AUTOMOBILES AVAILABLE, TENURE; RACE OF HEAD (15%)
18	AIR CONDITIONING, TENURE; RACE OF HEAD (15%)
19	GROSS RENT AND RACE OF HEAD
20	ASKING RENT AND INCLUSION OF UTILITIES
21	LOCATION OF STRUCTURE AND VACANCY STATUS
22	STORIES IN STRUCTURE, TENURE; RACE OF HEAD (5%)
23	UNITS IN STRUCTURE WITH 4 STORIES OR MORE BY PASSENGER ELEVATOR, TENURE; RACE OF HEAD (5%)
24	COOKING FUEL, TENURE; RACE OF HEAD (5%)
25	HOUSE HEATING FUEL, TENURE; RACE OF HEAD (5%)
26	WATER HEATING FUEL, TENURE; RACE OF HEAD (5%)
27	NUMBER OF BEDROOMS, TENURE, AND RACE OF HEAD (5%)
28	CLOTHES WASHING MACHINE, TENURE; RACE OF HEAD (5%)
29	CLOTHES DRYER, TENURE; RACE OF HEAD (5%)
30	DISHWASHER, TENURE; RACE OF HEAD (5%)
31	HOME FOOD FREEZER, TENURE; RACE OF HEAD (5%)
32	NUMBER OF TELEVISION SETS, TENURE; RACE OF HEAD (5%)
33	BATTERY-OPERATED RADIO, TENURE; RACE OF HEAD (5%)
34	SECOND HOME, TENURE; RACE OF HEAD (5%)
35	OCCUPANCY/VACANCY STATUS
36	TENURE
37	NUMBER OF PERSONS IN UNIT, TENURE, AND RACE OF HEAD
38	HOUSEHOLDS BY TYPE, AGE OF HEAD, TENURE; RACE OF HEAD
39	HOUSEHOLD TYPE WITH HEAD 62 YEARS OLD AND OVER BY TENURE; RACE OF HEAD
40	AGE AND SEX OF HEAD FOR 1-PERSON HOUSEHOLDS BY TENURE; RACE OF HEAD

4th Count (Housing) - 13

Table of Contents (Continued)

Tabulation Number	Title
41	HOUSEHOLDS WITH NONRELATIVES BY TE
42	PERSONS PER ROOM, TENURE, AND RACI
43	COMPLETE KITCHEN FACILITIES, TENU..
44	ACCESS AND COMPLETE KITCHEN FACILITIES, -
45	WATER SUPPLY, TENURE; RACE OF HEAD
46	TOILET FACILITIES, TENURE; RACE OF HEAD
47	BATHING FACILITIES, TENURE; RACE OF HEAD
48	NUMBER OF ROOMS IN UNIT, TENURE, AND RACE OF HEAD
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Appendix C.4.

Summary of 1970 Census Subject Report - American Indians PC(2)-1F

Refers to: Chapter IV.B.

SMSA's With 2,500 or More Indian Population
Reservations With 2,300 or More Indian Population
Tribes With 3,800 or More Indian Population

Northern Cheyenne, Mont.

RELATIONSHIP TO HEAD OF HOUSEHOLD

Total population	2 357
Under 18 years old	1 181
Living with both parents	782
Percent of all under 18 years	66.2
Head of household	465
Head of family	440
Female head	124
Primary individual	25
Female primary individual	25
Wife of head	293
Other relative of head	1 483
Nonrelative of head	17
In group quarters	99
Inmate of institution	94
Other	5

FAMILIES BY PRESENCE OF CHILDREN

Total families	440
With own children under 18 years	310
With own children under 6 years	185
Husband-wife families	301
With own children under 18 years	240
With own children under 6 years	147
Families with female head	124
With own children under 18 years	59
With own children under 6 years	32

CHILDREN EVER BORN

Women ever married, 15 to 24 years old	86
Children per 1,000 women ever married	...
Women ever married, 25 to 34 years old	126
Children per 1,000 women ever married	3 262
Women ever married, 35 to 44 years old	108
Children per 1,000 women ever married	5 630

PLACE OF BIRTH

Total population	2 364
Foreign born	5
Native	2 359
Born in State of residence	1 899
Born in different State	352
Northeast	–
North Central	89
South	35
West	228
Born abroad, at sea, etc	–
State of birth not reported	108

SCHOOL ENROLLMENT

Total enrolled, 3 to 34 years old	740
Nursery school	46
Public	15
Kindergarten	39
Public	22
Elementary (1 to 8 years)	509
Public	244
High school (1 to 4 years)	137
Public	59
College	9
Percent enrolled, 3 to 34 years old	50.2
3 and 4 years old	33.3
5 and 6 years old	68.6
7 to 13 years old	87.0
14 to 17 years old: Male	87.4
Female	74.5
18 to 24 years old: Male	1.2
Female	29.9
25 to 34 years old	..

YEARS OF SCHOOL COMPLETED

Total, 25 years old and over		852
No school years completed		29
Elementary:	1 to 4 years	32
	5 to 7 years	194
	8 years	152
High school:	1 to 3 years	242
	4 years	178
College:	1 to 3 years	16
	4 years or more	9
Median school years completed		9.2
Percent high school graduates		23.8

SMSA's With 2,500 or More Indian Population
Reservations With 2,300 or More Indian Population
Tribes With 3,800 or More Indian Population

Northern Cheyenne, Mont.

AGE

Male, all ages	1 102
Under 5 years	156
5 to 9 years	181
10 to 14 years	131
15 to 19 years	126
20 to 24 years	110
25 to 29 years	57
30 to 34 years	67
35 to 39 years	62
40 to 44 years	39
45 to 49 years	45
50 to 54 years	60
55 to 59 years	35
60 to 64 years	7
65 to 69 years	17
70 to 74 years	9
75 years and over	–
Female, all ages	1 255
Under 5 years	192
5 to 9 years	211
10 to 14 years	153
15 to 19 years	173
20 to 24 years	72
25 to 29 years	91
30 to 34 years	47
35 to 39 years	61
40 to 44 years	50
45 to 49 years	41
50 to 54 years	57
55 to 59 years	34
60 to 64 years	27
65 to 69 years	17
70 to 74 years	17
75 years and over	12

MARITAL STATUS

Male, 14 years old and over	668
Single	273
Married, wife present	334
With spouse of some race	307
Separated	10
Other married, wife absent	25
Widowed	17
Divorced	9
Female, 14 years old and over	717
Single	204
Married, husband present	326
With spouse of some race	295
Separated	25
Other married, husband absent	17
Widowed	90
Divorced	55

YEARS OF SCHOOL COMPLETED

Male, 25 to 34 years old		124
Elementary:	Less than 5 years	–
	5 to 7 years	14
	8 years	11
High school:	1 to 3 years	39
	4 years	56
College:	1 to 3 years	–
	4 years or more	4
Female, 25 to 34 years old		138
Elementary:	Less than 5 years	–
	5 to 7 years	–
	8 years	13
High school:	1 to 3 years	55
	4 years	59
College:	1 to 3 years	11
	4 years or more	–

INDUSTRY

Total employed, 16 years old and over		593
Agriculture, forestry, and fisheries		54
Construction		19
Manufacturing:	Durable goods	136
	Nondurable goods	19
Transportation, communication, and other public utilities		11
Wholesale and retail trade		11
Personal services		–
Professional and related services		204
Other industries		139

SMSA's With 2,500 or More
Indian Population
Reservations With 2,300 or More
Indian Population
Tribes With 3,800 or More
Indian Population

	Northern Cheyenne, Mont.
EMPLOYMENT STATUS	
Male, 16 years old and over	607
Labor force	401
Percent of total	66.1
Civilian labor force	401
Employed	354
Unemployed	47
Percent of civilian labor force	11.7
Not in labor force	206
Female, 16 years old and over	667
Labor force	266
Percent of total	39.9
Civilian labor force	266
Employed	239
Unemployed	27
Percent of civilian labor force	10.2
Not in labor force	401
Male, 16 to 21 years old	123
Not enrolled in school	79
Not high school graduate	52
Unemployed or not in labor force	33
PERCENT IN LABOR FORCE	
Male: 14 and 15 years	–
16 to 19 years	...
20 to 24 years	86.4
25 to 34 years	76.6
35 to 44 years	91.1
45 to 64 years	55.8
65 years and over	–
Female: 14 and 15 years	–
16 to 19 years	34.0
20 to 24 years	...
25 to 34 years	59.4
35 to 44 years	51.4
45 to 64 years	29.6
65 years and over	...
CLASS OF WORKER	
Total employed, 16 years old and over	593
Private wage and salary workers	321
Government workers	253
Local government workers	57
Self-employed workers	19
Unpaid family workers	–
INCOME OF PERSONS IN 1969	
Male, 16 years old and over	607
Without income	39
With income	568
$1 to $999 or loss	179
$1,000 to $1,999	89
$2,000 to $2,999	72
$3,000 to $3,999	60
$4,000 to $4,999	32
$5,000 to $5,999	40
$6,000 to $6,999	57
$7,000 to $7,999	17
$8,000 to $8,999	5
$9,000 to $9,999	4
$10,000 to $14,999	4
$15,000 or more	9
Median income	$2 222
Mean income	$3 121
Female, 16 years old and over	667
Without income	184
With income	483
$1 to $999 or loss	195
$1,000 to $1,999	97
$2,000 to $2,999	71
$3,000 to $3,999	51
$4,000 to $4,999	36
$5,000 to $5,999	26
$6,000 to $6,999	–
$7,000 to $7,999	7
$8,000 to $8,999	–
$9,000 to $9,999	–
$10,000 to $14,999	–
$15,000 or more	–
Median income	$1 479
Mean income	$1 890

SMSA's With 2,500 or More
Indian Population
Reservations With 2,300 or More
Indian Population
Tribes With 3,800 or More
Indian Population

	Northern Cheyenne, Mont.
INCOME OF FAMILIES	
All families	440
Less than $1,000	16
$1,000 to $1,999	40
$2,000 to $2,999	70
$3,000 to $3,999	31
$4,000 to $4,999	48
$5,000 to $5,999	54
$6,000 to $6,999	31
$7,000 to $7,999	31
$8,000 to $8,999	26
$9,000 to $9,999	22
$10,000 to $11,999	43
$12,000 to $14,999	15
$15,000 to $24,999	9
$25,000 and over	4
Median income	$5 278
Mean income	$5 957
All unrelated individuals 14 years old and over	37
Mean income	...
Per capita income of persons	$1 154
INCOME LESS THAN POVERTY LEVEL	
Persons	916
Percent of all persons	40.7
Percent 65 years old and over	5.2
Families	175
Percent of all families	39.8
Mean size of family	5.20
Mean income deficit	$1 828
With related children under 18 years	153
Families with female head	68
Unrelated individuals 14 years old and over	29
Percent of all unrelated individuals 14 years and over	...
Mean income deficit	...
Percent 65 years old and over	...
WORKERS IN 1969 BY WEEKS WORKED	
Male, 16 years old and over	490
50 to 52 weeks	206
27 to 49 weeks	131
26 weeks or less	153
Female, 16 years old and over	325
50 to 52 weeks	114
27 to 49 weeks	80
26 weeks or less	131
MAJOR OCCUPATION GROUP	
Male employed, 16 years old and over	354
Professional, technical, and kindred workers	15
Managers and administrators, except farm	20
Sales workers	6
Clerical and kindred workers	24
Craftsmen, foremen, and kindred workers	63
Operatives, including transport	56
Laborers, except farm	47
Farmers and farm managers	19
Farm laborers and foremen	35
Service workers, except private household	69
Private household workers	–
Female employed, 16 years old and over	239
Professional, technical, and kindred workers	35
Managers and administrators, except farm	6
Sales workers	–
Clerical and kindred workers	75
Craftsmen, foremen, and kindred workers	–
Operatives, including transport	48
Laborers, except farm	21
Farmers and farm managers	–
Farm laborers and foremen	–
Service workers, except private household	54
Private household workers	–
URBAN AND RURAL RESIDENCE	
Total population	2 357
Urban	–
Rural nonfarm	1 789
Rural farm	568

SMSA's With 2,500 or More Indian Population
Reservations With 2,300 or More Indian Population
Tribes With 3,800 or More Indian Population

	Northern Cheyenne, Mont.
Total households	467
In owner occupied units	363
Percent	77.7
In renter occupied units	104
ROOMS	
1 room	62
2 rooms	88
3 rooms	120
4 rooms	93
5 rooms	62
6 rooms	32
7 rooms or more	10
Median	3.2
PERSONS	
1 person	34
2 persons	62
3 persons	59
4 persons	68
5 persons	64
6 persons or more	180
Median, all occupied units	4.7
Median, owner occupied units	4.9
Median, renter occupied units	3.8
Units with roomers, boarders, or lodgers	10
PERSONS PER ROOM	
1.00 or less	198
1.01 to 1.50	63
1.51 or more	206
Units with all plumbing facilities—1.01 or more	129
UNITS IN STRUCTURE	
1 (includes mobile home or trailer)	450
2	17
3 and 4	–
5 to 49	–
50 or more	–
YEAR STRUCTURE BUILT	
1969 to March 1970	40
1965 to 1968	148
1960 to 1964	91
1950 to 1959	70
1940 to 1949	15
1939 or earlier	103
SELECTED EQUIPMENT	
With complete bathroom	216
With more than 1 bathroom	13
With piped water in the building	392
With public water supply	341
With public sewer	226
With air conditioning	20
AUTOMOBILES AVAILABLE	
1	243
2	30
3 or more	12
None	203
VALUE	
Specified owner occupied units[1]	225
Less than $5,000	135
$5,000 to $7,499	49
$7,500 to $9,999	10
$10,000 to $14,999	9
$15,000 to $19,999	22
$20,000 to $24,999	–
$25,000 to $34,999	–
$35,000 to $49,999	–
$50,000 or more	–
Median	$4 200
CONTRACT RENT	
Specified renter occupied units[2]	104
Less than $30	39
$30 to $39	17
$40 to $59	20
$60 to $79	28
$80 to $99	–
$100 to $149	–
$150 to $199	–
$200 to $249	–
$250 or more	–
No cash rent	–
Median	$38

Appendix C.5.

BEA Employment for Rosebud and Big Horn Counties

Refers to: Chapter IV.B.

EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES
FULL AND PART-TIME WAGE AND SALARY EMPLOYMENT PLUS NUMBER OF PROPRIETORS

(32-035)
BIG HOR. MONTANA

	1970	1971	1972	1973	1974
TOTAL EMPLOYMENT	3,870	3,921	3,750	3,800	4,047
NUMBER OF PROPRIETORS	969	972	977	967	957
FARM PROPRIETORS	609	601	590	581	570
NON-FARM PROPRIETORS	360	371	387	386	387
WAGE AND SALARY EMPLOYMENT	2,901	2,949	2,773	2,833	3,090
FARM	472	513	515	514	558
NON-FARM	2,429	2,436	2,258	2,319	2,532
GOVERNMENT	767	806	850	872	951
TOTAL FEDERAL	333	339	364	349	413
FEDERAL CIVILIAN	333	339	364	349	413
MILITARY	--	--	--	--	--
STATE AND LOCAL	434	467	486	523	538
PRIVATE NON-FARM 1/	1,662	1,630	1,408	1,447	1,581
MANUFACTURING	329	176	143	120	(D)
MINING	(D)	(D)	(D)	(D)	224
CONSTRUCTION	60	183	190	157	168
TRANSPORT., COMM., AND PUBLIC UTILITIES	91	91	89	100	107
TRADE	443	436	442	502	518
FINANCE, INSURANCE, AND REAL ESTATE	61	63	63	71	78
SERVICES	607	552	393	373	409
OTHER	(D)	(D)	(D)	(D)	(D)

(D) NOT SHOWN TO AVOID DISCLOSURE OF CONFIDENTIAL INFORMATION. DATA ARE INCLUDED IN TOTALS.

1/ PRIMARY SOURCE FOR PRIVATE NON-FARM EMPLOYMENT: ES-202 COVERED EMPLOYMENT- MONTANA EMPLOYMENT SECURITY COMM.

REGIONAL ECONOMIC INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES
FULL AND PART-TIME WAGE AND SALARY EMPLOYMENT PLUS NUMBER OF PROPRIETORS

(30-047)
RCSERCC

MONTANA	1970	1971	1972	1973	1974
TOTAL EMPLOYMENT	2,546	2,792	2,984	3,227	3,511
NUMBER OF PROPRIETORS	732	737	744	738	731
FARM PROPRIETORS	423	417	410	404	396
NON-FARM PROPRIETORS	309	320	334	334	335
WAGE AND SALARY EMPLOYMENT	1,814	2,055	2,240	2,489	2,780
FARM	268	292	293	292	317
NON-FARM	1,546	1,763	1,947	2,197	2,463
GOVERNMENT	442	462	474	511	544
TOTAL FEDERAL	108	111	119	118	140
FEDERAL CIVILIAN	108	111	119	118	140
MILITARY	--	--	--	--	--
STATE AND LOCAL	334	351	355	393	404
PRIVATE NON-FARM 1/	1,104	1,301	1,473	1,686	1,919
MANUFACTURING	(D)	(D)	(D)	191	180
MINING	(D)	(D)	(D)	267	283
CONSTRUCTION	29	25	39	77	180
TRANSPORT.,COMM., AND PUBLIC UTILITIES	184	181	192	192	205
TRADE	216	242	268	311	346
FINANCE, INSURANCE, AND REAL ESTATE	19	26	37	(D)	(D)
SERVICES	395	514	562	601	672
OTHER	(D)	(D)	(D)	(D)	(D)

(D) NOT SHOWN TO AVOID DISCLOSURE OF CONFIDENTIAL INFORMATION. DATA ARE INCLUDED IN TOTALS.

1/ PRIMARY SOURCE FOR PRIVATE NON-FARM EMPLOYMENT: ES-202 COVERED EMPLOYMENT- MONTANA EMPLOYMENT SECURITY COMM.

REGIONAL ECONOMIC INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

TABLE 25.00

Appendix C.6.

BEA Earnings for Rosebud and Big Horn Counties

Refers to: Chapter IV.B.

BIG HORN MONTANA PERSONAL INCOME BY MAJOR SOURCES 1970-74 (THOUSANDS OF DOLLARS)

ITEM	1970	1971	1972	1973	1974
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/					
BY TYPE					
WAGE AND SALARY DISBURSEMENTS 2/	15,107	16,493	17,344	18,565	22,555
OTHER LABOR INCOME	685	813	908	1,031	1,309
PROPRIETORS INCOME	12,188	8,266	13,178	11,996	5,308
FARM	10,257	6,360	11,523	9,721	2,889
NONFARM	1,931	1,906	1,655	2,275	2,419
BY INDUSTRY					
FARM	12,018	8,297	13,639	12,066	5,798
NONFARM	15,962	17,275	17,791	19,526	23,374
PRIVATE 3/	10,709	11,279	10,956	12,059	14,759
MANUFACTURING	2,284	1,232	1,030	834	(D)
MINING	(D)	(D)	(D)	(D)	3,737
CONTRACT CONSTRUCTION	534	1,523	2,224	1,801	2,117
WHOLESALE AND RETAIL TRADE	2,523	2,751	2,776	3,311	3,709
FINANCE, INSURANCE, AND REAL ESTATE	484	523	545	597	648
TRANSP., COMM., & PUBLIC UTILITIES	769	790	835	934	1,055
SERVICES	3,240	2,925	2,170	2,305	2,579
OTHER INDUSTRIES	(D)	(D)	(D)	(D)	(D)
GOVERNMENT	5,253	5,996	6,835	7,467	8,615
FEDERAL, CIVILIAN	2,958	3,425	3,888	4,123	4,822
FEDERAL, MILITARY	141	158	184	199	213
STATE AND LOCAL	2,154	2,413	2,763	3,145	3,580
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE					
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	27,980	25,572	31,430	31,592	29,172
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	849	954	1,030	1,199	1,483
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	27,131	24,618	30,400	30,393	27,689
PLUS: RESIDENCE ADJUSTMENT	-1,805	-1,766	-1,806	-138	-57
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	25,326	22,852	28,594	30,255	27,632
PLUS: DIVIDENDS, INTEREST, AND RENT	3,373	3,534	3,315	4,009	4,499
PLUS: TRANSFER PAYMENTS	2,958	3,420	3,761	4,248	5,000
PERSONAL INCOME BY PLACE OF RESIDENCE	31,657	29,806	35,670	38,512	37,131
PER CAPITA INCOME	3,132	2,948	3,463	3,724	3,542
TOTAL POPULATION (THOUSANDS)	10.1	10.1	10.3	10.3	10.5

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - MONTANA EMPLOYMENT SECURITY COMM.
3/ (D) NOT SHOWN TO AVOID DISCLOSURE OF CONFIDENTIAL INFORMATION. DATA ARE INCLUDED IN TOTALS.

ROSEBUD MONTANA PERSONAL INCOME BY MAJOR SOURCES 1970-74 (THOUSANDS OF DOLLARS)

ITEM	1970	1971	1972	1973	1974
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/					
BY TYPE					
WAGE AND SALARY DISBURSEMENTS 2/	9,155	10,539	12,126	16,613	21,157
OTHER LABOR INCOME	586	686	847	1,268	1,502
PROPRIETORS INCOME	4,693	4,447	6,358	7,833	3,444
FARM	3,488	3,317	5,235	6,499	2,032
NONFARM	1,205	1,130	1,123	1,334	1,412
BY INDUSTRY					
FARM	4,499	4,431	6,451	7,845	3,700
NONFARM	9,935	11,241	12,880	17,869	22,403
PRIVATE 3/	7,371	8,302	9,660	14,141	18,156
MANUFACTURING	(D)	(D)	(D)	1,088	1,193
MINING	(D)	(D)	(D)	4,160	4,556
CONTRACT CONSTRUCTION	329	207	439	971	3,356
WHOLESALE AND RETAIL TRADE	1,190	1,320	1,394	1,743	2,007
FINANCE, INSURANCE, AND REAL ESTATE	150	194	261	(D)	(D)
TRANSP., COMM., & PUBLIC UTILITIES	1,720	1,822	2,015	2,284	2,635
SERVICES	2,046	2,436	2,808	3,470	3,878
OTHER INDUSTRIES	(D)	(D)	(D)	(D)	(D)
GOVERNMENT	2,564	2,939	3,220	3,728	4,247
FEDERAL, CIVILIAN	962	1,141	1,253	1,422	1,635
FEDERAL, MILITARY	84	95	114	130	139
STATE AND LOCAL	1,518	1,703	1,853	2,176	2,473
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE					
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	14,434	15,672	19,331	25,714	26,103
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	613	619	709	1,058	1,374
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	13,821	15,053	18,622	24,656	24,729
PLUS: RESIDENCE ADJUSTMENT	882	693	625	-1,362	-1,841
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	14,703	15,746	19,247	23,294	22,888
PLUS: DIVIDENDS, INTEREST, AND RENT	2,914	2,937	2,766	3,154	3,550
PLUS: TRANSFER PAYMENTS	2,189	2,440	2,532	2,949	3,540
PERSONAL INCOME BY PLACE OF RESIDENCE	19,806	21,123	24,545	29,397	29,978
PER CAPITA INCOME	3,266	3,459	3,835	4,264	3,911
TOTAL POPULATION (THOUSANDS)	6.1	6.1	6.4	6.9	7.7

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - MONTANA EMPLOYMENT SECURITY COMM.
3/ (D) NOT SHOWN TO AVOID DISCLOSURE OF CONFIDENTIAL INFORMATION. DATA ARE INCLUDED IN TOTALS.

TABLE 5.00

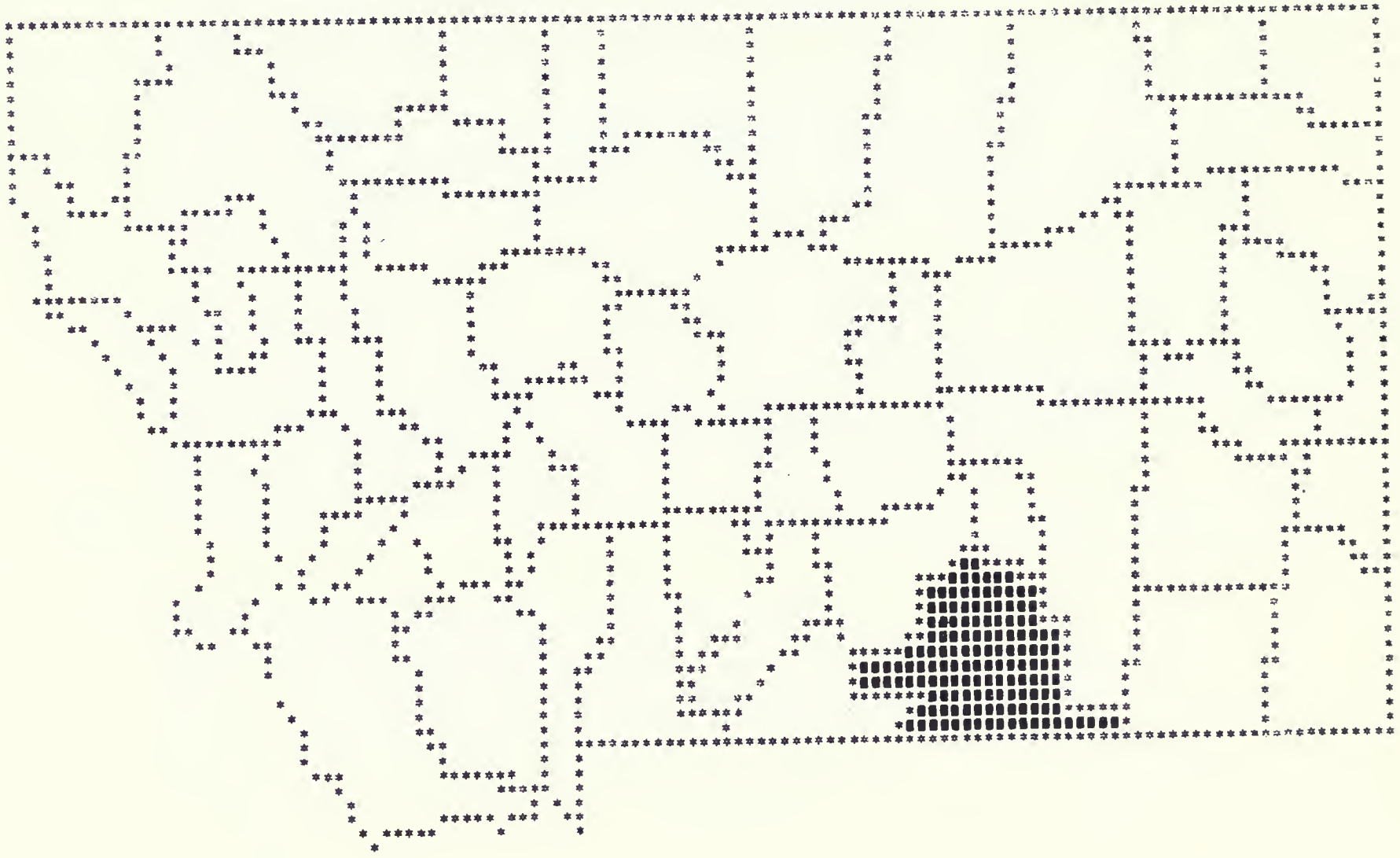
REGIONAL ECONOMICS INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

Appendix C.7.

County Profiles for Big Horn and Rosebud Counties

Refers to: Chapter IV.B.

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS



BIG HORN COUNTY

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
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BIG HORN COUNTY — GENERAL INFORMATION

DATE OF ORGANIZATION: JANUARY 13, 1913

CONGRESSIONAL DISTRICT: 2

PLANNING DISTRICT: 7

LAND AREA: 5023 SQ MILES

ROADS AND STREETS:

RURAL MILEAGE - 1532
MUNICIPAL MILEAGE - 25

NEWSPAPERS:

DAILY - 0
WEEKLY - 1

INCORPORATED PLACES:

PLACES:	1970 CENSUS:
HARDIN	2733
LODGE GRASS	806

PUBLIC USE AIRPORTS: 2

BANKS: 2

HOSPITALS: 2

CLASS OF COUNTY: 3

VALUATION:

ASSESSED - 77405874 DOLLARS
TAXABLE - 29412823 DOLLARS

BROADCAST STATIONS:

RADIO - 1
TV - 0

LIBRARIES:

PUBLIC - 2
INSTITUTIONAL AND SPECIAL - 0
SCHOOL - 7

SPECIAL NOTES: THE COUNTY SEAT IS HARDIN.
THE CROW INDIAN RESERVATION IS MOSTLY IN BIG HORN COUNTY.
CROW AGENCY IS THE HEADQUARTERS OF THE CROW RESERVATION.

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BIG HORN COUNTY

1. POPULATION

-TABLE 1.1-
URBAN AND RURAL CLASSIFICATION, 1960 AND 1970

ITEM	1960 NUMBER	1960 % OF TOTAL	1970 NUMBER	1970 % OF TOTAL	% CHANGE 1960 TO 1970
URBAN	2789	27.9%	2733	27.2%	-2.0%
RURAL	7218	72.1%	7340	73.0%	1.7%
RURAL FARM	3243	32.4%	2756	27.4%	-15.0%
RURAL NON-FARM	3975	39.7%	4584	45.6%	15.3%

(RUPAL FARM AND NON-FARM DATA BASED ON SAMPLE)

-TABLE 1.2-
RACE CLASSIFICATION, 1960 AND 1970

ITEM	1960 NUMBER	1960 % OF TOTAL	1970 NUMBER	1970 % OF TOTAL	% CHANGE 1960 TO 1970
WHITE	6584	65.8%	6018	59.8%	-8.6%
NON-WHITE	3423	34.2%	4039	40.2%	18.0%
INDIAN	3334	33.3%	3917	38.9%	17.5%
OTHER NON-WHITE	89	0.9%	122	1.2%	37.1%

-TABLE 1.3-
TOTAL POPULATION BY SEX, 1940, 1950, 1960, AND 1970

SEX	1940 NUMBER	1950 NUMBER	1950 % CHANGE FROM 1940	1960 NUMBER	1960 % CHANGE FROM 1950	1970 NUMBER	1970 % CHANGE FROM 1960
MALE	5683	5206	-8.4%	5032	-3.3%	4990	-0.8%
FEMALE	4736	4618	-2.5%	4975	7.7%	5067	1.8%
TOTAL	10419	9824	-5.7%	10007	1.9%	10057	0.5%

SOURCES: TABLE 1.1 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA
TABLE 1.2 IBID
TABLE 1.3 US CENSUS OF POP: 1940, 1950, VOL II, CHAR OF THE POP; 1960, 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

1. POPULATION

-TABLE 1.4-
TOTAL POPULATION, ESTIMATES FOR 1971,1972,1973 AND 1974

1971		1972		1973		1974	
NUMBER	% CHANGE FROM 1970	NUMBER	% CHANGE FROM 1971	NUMBER	% CHANGE FROM 1972	NUMBER	% CHANGE FROM 1973
10100	0.4%	10300	2.0%	10300	0.0%	10500	1.9%

(1974 ESTIMATES ARE PROVISIONAL)

-TABLE 1.5-
TOTAL POPULATION, PROJECTED TO 1975 AND 1980, UNDER 3 ALTERNATIVE MIGRATION ASSUMPTIONS

CONTINUED 1960-1970 MIGRATION TRENDS TO 1980		NO NET MIGRATION FROM 1970 TO 1980		CONTINUED 1970-1973 MIGRATION TRENDS TO 1980	
1975	1980	1975	1980	1975	1980
10145	10174	10947	12318	11824	14320

-TABLE 1.6-
NET MIGRATION, 1950 TO 1960, AND 1960 TO 1970

NET MIGRATION 1950 TO 1960	NET MIGRATION 1960 TO 1970	% CHANGE BETWEEN DECENNIA
-1966	-1795	8.7%

SOURCES: TABLE 1.4 US BUR OF THE CENSUS, CURRENT POP REPORTS, SERIES P-26, NOS 19, 53
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JUNE 1975

BIG HORN COUNTY

1. POPULATION

-TABLE 1.7-
TOTAL POPULATION BY SEX AND AGE FOR 1960 AND 1970

SEX/AGE GROUPS	1960 NUMBER	1960 % OF TOTAL	1970 NUMBER	1970 % OF TOTAL	% CHANGE 1960 TO 1970
MALE					
UNDER 5	664	13.2%	544	10.9%	-18.1%
5-17	1482	29.5%	1554	31.1%	4.9%
5 YEAR OLDS	122	2.4%	129	2.6%	5.7%
18-64	2507	49.8%	2538	50.9%	1.2%
18 YEAR OLDS	70	1.4%	98	2.0%	40.0%
65 AND OVER	379	7.5%	354	7.1%	-6.6%
ALL AGES	5032	100.0%	4990	100.0%	-0.8%
FEMALE					
UNDER 5	734	14.8%	560	11.1%	-23.7%
5-17	1517	30.5%	1578	31.1%	4.0%
5 YEAR OLDS	138	2.8%	110	2.2%	-20.3%
18-64	2364	47.5%	2590	51.1%	9.6%
18 YEAR OLDS	74	1.5%	91	1.8%	23.0%
65 AND OVER	360	7.2%	339	6.7%	-5.8%
ALL AGES	4975	100.0%	5067	100.0%	1.8%
TOTAL					
UNDER 5	1398	14.0%	1104	11.0%	-21.0%
5-17	2999	30.0%	3132	31.1%	4.4%
5 YEAR OLDS	260	2.6%	239	2.4%	-8.1%
18-64	4871	48.7%	5128	51.0%	5.3%
18 YEAR OLDS	144	1.4%	189	1.9%	31.3%
65 AND OVER	739	7.4%	693	6.9%	-6.2%
ALL AGES	10007	100.0%	10057	100.0%	0.5%

SOURCES: TABLE 1.7 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, 1970, VOL 1, CHAR OF THE POP, PT 28, MONTANA

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

2. EMPLOYMENT

TABLE 2.1-
EMPLOYMENT STATUS BY SEX, SIXTEEN YEARS OLD AND OVER, 1970

STATUS	TOTAL	MALE		FEMALE	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
COUNT	6227	3090	49.6%	3137	50.4%
LABOR FORCE	3317	2332	70.3%	985	29.7%
CIVILIAN LABOR FORCE	3317	2332	70.3%	985	29.7%
EMPLOYED	3163	2217	70.1%	946	29.9%
UNEMPLOYED	154	115	74.7%	39	25.3%
NOT IN LABOR FORCE	2910	758	26.0%	2152	74.0%
ENROLLED IN SCHOOL	340	155	45.6%	185	54.4%

-TABLE 2.2-
EMPLOYMENT STATUS BY SEX, FOURTEEN YEARS OLD AND OVER, 1960

STATUS	TOTAL	MALE		FEMALE	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
COUNT	6377	3266	51.2%	3111	48.8%
LABOR FORCE	3265	2458	75.3%	807	24.7%
CIVILIAN LABOR FORCE	3265	2458	75.3%	807	24.7%
EMPLOYED	2941	2212	75.2%	729	24.8%
UNEMPLOYED	324	246	75.9%	78	24.1%
NOT IN LABOR FORCE	3112	808	26.0%	2304	74.0%
ENROLLED IN SCHOOL	730	337	46.2%	393	53.8%

SOURCES: TABLE 2.1 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA
TABLE 2.2 US CENSUS OF POP: 1960, VOL I, CHAR OF THE POP, PT 28, MONTANA

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

2. EMPLOYMENT

-TABLE 2.3-
EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES, FULL AND PART TIME WAGE AND SALARY EMPLOYMENT, PLUS THE NUMBER OF PROPRIETORS, 1968 THROUGH 1972

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL EMPLOYMENT	3424	3407	3737	3783	3742
NUMBER OF PROPPRIETORS	913	971	969	972	965
FARM	624	616	609	601	590
NON-FARM	289	355	360	371	375
WAGE AND SALARY EMPLOYMENT	2511	2436	2768	2811	2777
FARM	466	459	459	499	500
NON-FARM	2045	1977	2309	2312	2277
GOVERNMENT	742	694	724	746	779
TOTAL FEDERAL	370	323	333	340	365
FEDERAL CIVILIAN	370	323	333	340	365
MILITARY	0	0	0	0	0
STATE AND LOCAL	372	371	391	406	414
PRIVATE NON-FARM	1303	1283	1585	1566	1498
MANUFACTURING	WITHHELD	260	329	176	143
MINING	92	104	67	125	WITHHELD
CONSTRUCTION	140	90	59	179	192
TRANSP,COMM,PUB UTIL	97	98	102	103	99
TRADE	495	444	435	428	436
FINANCE,INSUR,REAL ESTATE	45	50	58	59	61
SERVICES	375	235	531	493	480
OTHER	WITHHELD	2	4	3	WITHHELD

SOURCES: TABLE 2.3 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)

PROFILES
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MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

2. EMPLOYMENT

-TABLE 2.4-
EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES, FULL AND PART TIME WAGE AND SALARY EMPLOYMENT, PLUS THE NUMBER OF PROPRIETORS, 1968 THROUGH 1972, AS A PERCENT OF TOTAL EMPLOYMENT

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL EMPLOYMENT	100.0%	100.0%	100.0%	100.0%	100.0%
NUMBER OF PROPPRIETORS	26.7%	28.5%	25.9%	25.7%	25.8%
FARM	18.2%	18.1%	16.3%	15.9%	15.8%
NON-FARM	8.4%	10.4%	9.6%	9.8%	10.0%
WAGE AND SALARY EMPLOYMENT	73.3%	71.5%	74.1%	74.3%	74.2%
FARM	13.6%	13.5%	12.3%	13.2%	13.4%
NON-FARM	59.7%	58.0%	61.8%	61.1%	60.8%
GOVERNMENT	21.7%	20.4%	19.4%	19.7%	20.8%
TOTAL FEDERAL	10.8%	9.5%	8.9%	9.0%	9.8%
FEDERAL CIVILIAN	10.8%	9.5%	8.9%	9.0%	9.8%
MILITARY	0.0%	0.0%	0.0%	0.0%	0.0%
STATE AND LOCAL	10.9%	10.9%	10.5%	10.7%	11.1%
PRIVATE NON-FARM	38.1%	37.7%	42.4%	41.4%	40.0%
MANUFACTURING	0.0%	7.6%	8.8%	4.7%	3.8%
MINING	2.7%	3.1%	1.8%	3.3%	0.0%
CONSTRUCTION	4.1%	2.6%	1.6%	4.7%	5.1%
TRANSP,COMM,PUB UTIL	2.8%	2.9%	2.7%	2.7%	2.6%
TRADE	14.5%	13.0%	11.6%	11.3%	11.7%
FINANCE,INSUR,REAL ESTATE	1.3%	1.5%	1.6%	1.6%	1.6%
SERVICES	11.0%	6.9%	14.2%	13.0%	12.8%
OTHER	0.0%	0.1%	0.1%	0.1%	0.0%

SOURCES: TABLE 2.4 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)

-TABLE 2.5-
EMPLOYMENT BY OCCUPATION, BY SEX, 16 YEARS OLD AND OVER, 1970

OCCUPATION	TOTAL	MALE		FEMALE	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
TOTAL EMPLOYED	3163	2217	70.1%	946	29.9%
PROFESSIONAL AND TECHNICAL	432	269	62.3%	163	37.7%
MANAGERS AND ADMINISTRATORS (NON-FARM)	302	219	72.5%	83	27.5%
SALES WORKERS	130	88	67.7%	42	32.3%
CLERICAL	358	65	18.2%	293	81.8%
CRAFTSMEN AND FOREMEN	305	305	100.0%	0	0.0%
OPERATIVES	265	204	77.0%	61	23.0%
LABORERS (NON-FARM)	135	135	100.0%	0	0.0%
FARMERS AND FARM MANAGERS	554	515	93.0%	39	7.0%
FARM LABORERS AND FOREMEN	298	294	98.7%	4	1.3%
SERVICE WORKERS	375	123	32.8%	252	67.2%
PRIVATE HOUSEHOLD WORKERS	9	0	0.0%	9	100.0%

SOURCES: TABLE 2.5 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

-TABLE 2.6-
EMPLOYMENT BY OCCUPATION, BY SEX, TOTAL EMPLOYED, 1960

OCCUPATION	TOTAL	MALE		FEMALE	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
TOTAL EMPLOYED	2941	2212	75.2%	729	24.8%
PROFESSIONAL AND TECHNICAL	281	145	51.6%	136	48.4%
MANAGERS AND ADMINISTRATORS (NON-FARM)	249	211	84.7%	38	15.3%
SALES WORKERS	102	48	47.1%	54	52.9%
CLERICAL	219	85	38.8%	134	61.2%
CRAFTSMEN AND FOREMEN	264	260	98.5%	4	1.5%
OPERATIVES	219	198	90.4%	21	9.6%
LABORERS (NON-FARM)	128	124	96.9%	4	3.1%
FARMERS AND FARM MANAGERS	626	584	93.3%	42	6.7%
FARM LABORERS AND FOREMEN	473	447	94.5%	26	5.5%
SERVICE WORKERS	297	89	30.0%	208	70.0%
PRIVATE HOUSEHOLD WORKERS	43	0	0.0%	43	100.0%

SOURCES: TABLE 2.6 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, VOL I, CHAR OF THE POP, PT 28, MONTANA

BIG HORN COUNTY

3. PERSONAL INCOME

-TABLE 3.1-
PERSONAL INCOME BY MAJOR SOURCES AND EARNINGS BY BROAD INDUSTRIAL SECTOR IN THOUSANDS OF DOLLARS, 1968 THROUGH 1972

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL PERSONAL INCOME	20334	28341	31095	31834	38884
TOTAL WAGES AND SALARIES	11404	12158	12833	14672	16193
OTHER LABOR INCOME	440	551	675	801	892
PROPRIETORS INCOME	3818	10728	12028	10232	15112
FARM PROPRIETORS INCOME	2572	9217	10447	8632	13455
NON-FARM PROPRIETORS INCOME	1246	1511	1581	1600	1657
PROPERTY INCOME	2973	3152	3428	3784	3991
TRANSFER PAYMENTS	2368	2505	2957	3358	3705
LESS: PERSONAL CONTRIBUTIONS	669	753	826	1013	1009
TOTAL EARNINGS	15662	23437	25536	25705	32197
FARM EARNINGS	4097	10940	12208	10652	15688
NON-FARM EARNINGS	11565	12497	13328	15053	16509
GOVERNMENT EARNINGS	4358	4197	4610	5323	6035
TOTAL FEDERAL	2973	2723	3002	3494	4060
FEDERAL CIVILIAN	2859	2599	2861	3344	3893
MILITARY	114	124	141	150	167
STATE AND LOCAL	1385	1474	1608	1829	1975
PRIVATE NON-FARM EARNINGS	7207	8300	8718	9730	10474
MANUFACTURING	WITHHELD	1706	2280	1227	1026
MINING	717	840	564	1194	WITHHELD
CONTRACT CONSTRUCTION	1285	779	526	1491	2199
TRANSP, COMM, AND PUB UTIL	747	751	878	908	964
WHOLESALE AND RETAIL TRADE	2535	2289	2370	2562	2769
FINANCE, INS, REAL ESTATE	401	428	481	530	562
SERVICES	1152	1171	1309	1461	1492
OTHER	WITHHELD	336	310	357	WITHHELD

SOURCES: TABLE 3.1 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)

3. PERSONAL INCOME

-TABLE 3.2-
PERSONAL INCOME BY MAJOR SOURCES AS A PERCENT OF TOTAL PERSONAL INCOME,
AND EARNINGS BY BROAD INDUSTRIAL SECTOR AS A PERCENT OF TOTAL EARNINGS, 1968 THROUGH 1972

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL PERSONAL INCOME	100.0%	100.0%	100.0%	100.0%	100.0%
TOTAL WAGES AND SALARIES	56.1%	42.9%	41.3%	46.1%	41.6%
OTHER LABOR INCOME	2.2%	1.9%	2.2%	2.5%	2.3%
PROPRIETORS INCOME	18.8%	37.9%	38.7%	32.1%	38.9%
FARM PROPRIETORS INCOME	12.6%	32.5%	33.6%	27.1%	34.6%
NON-FARM PROPRIETORS INCOME	6.1%	5.3%	5.1%	5.0%	4.3%
PROPERTY INCOME	14.6%	11.1%	11.0%	11.9%	10.3%
TRANSFER PAYMENTS	11.6%	8.8%	9.5%	10.5%	9.5%
LESS: PERSONAL CONTRIBUTIONS	3.3%	2.7%	2.7%	3.2%	2.6%
TOTAL EARNINGS	100.0%	100.0%	100.0%	100.0%	100.0%
FARM EARNINGS	26.2%	46.7%	47.8%	41.4%	48.7%
NON-FARM EARNINGS	73.8%	53.3%	52.2%	58.6%	51.3%
GOVERNMENT EARNINGS	27.8%	17.9%	18.1%	20.7%	18.7%
TOTAL FEDERAL	19.0%	11.6%	11.8%	13.6%	12.6%
FEDERAL CIVILIAN	18.3%	11.1%	11.2%	13.0%	12.1%
MILITARY	0.7%	0.5%	0.6%	0.6%	0.5%
STATE AND LOCAL	8.8%	6.3%	6.3%	7.1%	6.1%
PRIVATE NON-FARM EARNINGS	46.0%	35.4%	34.1%	37.9%	32.5%
MANUFACTURING	0.0%	7.3%	8.9%	4.8%	3.2%
MINING	4.6%	3.6%	2.2%	4.6%	0.0%
CONTRACT CONSTRUCTION	8.2%	3.3%	2.1%	5.8%	6.8%
TRANSP, COMM, AND PUB UTIL	4.8%	3.2%	3.4%	3.5%	3.0%
WHOLESALE AND RETAIL TRADE	16.2%	9.8%	9.3%	10.0%	8.6%
FINANCE, INS, REAL ESTATE	2.6%	1.8%	1.9%	2.1%	1.7%
SERVICES	7.4%	5.0%	5.1%	5.7%	4.6%
OTHER	0.0%	1.4%	1.2%	1.4%	0.0%

SOURCES: TABLE 3.2 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)

3. PERSONAL INCOME

-TABLE 3.3-
PER CAPITA PERSONAL INCOME, RESIDENCE ADJUSTED, IN DOLLARS, 1967 THROUGH 1973

ITEM	1967	1968	1969	1970	1971	1972	1973
PER CAPITA INCOME (DOLLARS)	2150	2472	2758	3074	3106	3898	4550

-TABLE 3.4-
MEDIAN FAMILY INCOME, 1949, 1959, 1969

ITEM	1949	1959		1969	
	NUMBER	NUMBER	% CHANGE FROM 1949	NUMBER	% CHANGE FROM 1959
MEDIAN FAMILY INCOME (DOLLARS)	2459	4375	77.9%	7275	66.3%

-TABLE 3.5-
FAMILIES WITH INCOME LESS THAN POVERTY LEVEL, LESS THAN 75% OF POVERTY LEVEL, AND LESS THAN 125% OF POVERTY LEVEL, 1969

ITEM	INCOME LESS THAN POVERTY LEVEL		INCOME LESS THAN 75% OF POVERTY LEVEL		INCOME LESS THAN 125% OF POVERTY LEVEL	
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
FAMILIES	474	21.4%	326	14.7%	636	28.6%
UNRELATED INDIVIDUALS	189	33.3%	132	23.3%	238	42.0%
PERSONS	2522	25.3%	1750	17.5%	3353	33.5%

SOURCES: TABLE 3.3 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)
TABLE 3.4 US BUR OF THE CENSUS, US CENSUS OF POP: 1950, VOL II, CHAR OF THE POP, PT 26, MONTANA; 1960, 1970, VOL I, PT 28
TABLE 3.5 US CENSUS OF POP: 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

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BIG HORN COUNTY

3. PERSONAL INCOME

-TABLE 3.6-
NUMBER OF FAMILIES BY INCOME LEVELS, 1959 AND 1969

FAMILY INCOME	NUMBER OF FAMILIES 1959	% OF TOTAL	1969	% OF TOTAL	% CHANGE 1959 TO 1969
ALL FAMILIES	2187	100.0%	2220	100.0%	1.5%
UNDER $1000	162	7.4%	123	5.5%	-24.1%
$1000 TO $1999	261	11.9%	98	4.4%	-62.5%
$2000 TO $2999	254	11.6%	176	7.9%	-30.7%
$3000 TO $3999	303	13.9%	170	7.7%	-43.9%
$4000 TO $4999	303	13.9%	152	6.8%	-49.8%
$5000 TO $5999	233	10.7%	182	8.2%	-21.9%
$6000 TO $6999	189	8.6%	156	7.0%	-17.5%
$7000 TO $7999	134	6.1%	171	7.7%	27.6%
$8000 TO $8999	76	3.5%	180	8.1%	136.8%
$9000 TO $9999	75	3.4%	130	5.9%	73.3%
$10000 TO $14999	123	5.6%	468	21.1%	280.5%
$15000 TO $24999	62	2.8%	129	5.8%	108.1%
$25000 AND OVER	12	0.5%	85	3.8%	608.3%

SOURCES: TABLE 3.6 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

4. HOUSING

-TABLE 4.1-
COUNT OF HOUSING UNITS BY OCCUPANCY AND VACANCY STATUS, 1970

ITEM	OCCUPIED		VACANT				
			FOR RENT		FOR SALE		OTHER
	BY OWNER	BY RENTER	NUMBER	RATE	NUMBER	RATE	NUMBER
HOUSING UNITS	1711	953	79	7.7%	5	0.3%	120

-TABLE 4.2-
PERSONS PER ROOM FOR OWNER AND RENTER OCCUPIED UNITS, 1970

PERSONS PER ROOM	TOTAL	OWNER OCCUPIED	RENTER OCCUPIED
1.00 OR LESS	2049	1277	772
1.01 - 1.50	321	225	96
1.51 OR MORE	294	209	85

-TABLE 4.3-
COUNT OF SELECTED RENTER-OCCUPIED UNITS BY MONTHLY RENT IN DOLLARS, 1970

DOLLAR RANGE	TOTAL	WITH ALL PLUMBING FACILITIES	LACKING ONE OR MORE PLUMBING FACILITIES
LESS THAN $40	111	90	21
$40 - $59	193	170	23
$60 - $79	183	169	14
$80 - $99	45	45	0
$100 - $149	53	52	1
$150 - $199	0	0	0
$200 OR MORE	7	7	0

SOURCES: TABLE 4.1 US BUR OF THE CENSUS, US CENSUS OF HOUSING: 1970, FIRST COUNT SUMM COMPUTER TAPES, MONTANA DEPT OF IGR
TABLE 4.2 IBID
TABLE 4.3 IBID

-TABLE 4.4-
COUNT OF OWNER-OCCUPIED UNITS FOR WHICH DOLLAR VALUE IS TABULATED, 1970

DOLLAR VALUE	COUNT OF OWNER-OCCUPIED UNITS	
	NUMBER	% OF TOTAL
TOTAL COUNT	907	100.0%
LESS THAN $5000	180	19.8%
$5000 - $9999	301	33.2%
$10000 - $14999	203	22.4%
$15000 - $19999	141	15.5%
$20000 - $24999	48	5.3%
$25000 - $34999	26	2.9%
$35000 - $49999	6	0.7%
$50000 AND OVER	2	0.2%

-TABLE 4.5-
HOUSEHOLDS BY TYPE AND INCOME, 1970

TYPE	LESS THAN $5000	$5000 TO $9999	$10000 TO $14999	$15000 OR MORE
HUSBAND-WIFE FAMILY	534	220	20	103
OTHER FAMILY	730	199	4	21
PRIMARY INDIVIDUAL	427	74	327	5

-TABLE 4.6-
OCCUPIED UNITS BY TYPE AND PLUMBING FACILITIES, 1970

FACILITIES	TOTAL	OWNER		RENTER	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
WITH ALL PLUMBING FACILITIES	2327	1501	64.5%	826	35.5%
LACKING ONE OR MORE PLUMBING FACILITIES	337	210	62.3%	127	37.7%

SOURCES: TABLE 4.4 US BUR OF THE CENSUS, US CENSUS OF HOUSING: 1970, FIRST COUNT SUMM COMPUTER TAPES, MONTANA DEPT OF IGR
TABLE 4.5 IBID
TABLE 4.6 IBID

5. EDUCATION

-TABLE 5.1-
TOTAL SCHOOL ENROLLMENT, PUBLIC AND NON-PUBLIC, 1968-69 THROUGH 1974-75

CLASSIFICATION	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
PUBLIC							
ALL GRADES	2537	2523	2507	2505	2475	2493	2451
ELEMENTARY	1923	1912	1895	1894	1851	1849	1760
HIGH SCHOOL	614	611	612	611	624	644	691
NON-PUBLIC							
ALL GRADES	338	377	397	434	548	579	645
ELEMENTARY	338	377	397	434	457	469	549
HIGH SCHOOL	0	0	0	0	91	110	96
TOTAL							
ALL GRADES	2875	2900	2904	2939	3023	3072	3096
ELEMENTARY	2261	2289	2292	2328	2308	2318	2309
HIGH SCHOOL	614	611	612	611	715	754	787

-TABLE 5.2-
SCHOOL CENSUS DATA, 1968-69 THROUGH 1972-73

AGES	1968-69	1969-70	1970-71	1971-72	1972-73
TOTAL	5543	5470	5666	4670	4661
UNDER 6	1515	1471	1508	967	964
6 - 20	4028	3999	4158	3703	3697

SOURCES: TABLE 5.1 OFFICE OF THE SUPT OF PUBLIC INSTRUCTION, MONTANA, MONTANA SCHOOL STATISTICS
TABLE 5.2 IBID

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BIG HORN COUNTY

5. EDUCATION

-TABLE 5.3-
EDUCATIONAL ATTAINMENT BY SEX AGED 25 YEARS OR MORE, 1970

YEARS OF SCHOOL COMPLETED	MALE	FEMALE
ELEMENTARY	491	398
HIGH SCHOOL	566	655
COLLEGE	256	196
MEDIAN SCHOOL YEARS COMPLETED	10.7	11.8
PERCENT HIGH SCHOOL GRADUATES	40.3	48.4

-TABLE 5.4-
MEDIAN SCHOOL YEARS COMPLETED, 1950, 1960 AND 1970

ITEM	1950	1960	1970
MEDIAN SCHOOL YEARS COMPLETED	8.8	9.6	11.2

-TABLE 5.5-
NUMBER OF PUBLIC SCHOOL TEACHERS AND STUDENT-TEACHER RATIOS, 1968-69 THROUGH 1974-1975

ITEM	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
NUMBER OF TEACHERS	114	129	144	144	105	143	153
STUDENT-TEACHER RATIO	22.3	19.6	17.4	17.4	23.6	17.4	16.0

SOURCES: TABLE 5.3 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA
TABLE 5.4 US BUR OF THE CENSUS, COUNTY AND CITY DATA BOOK, 1952, 1962, 1972
TABLE 5.5 COMPUTED FROM MONTANA SCHOOL STATISTICS

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BIG HORN COUNTY

6. HEALTH AND VITAL STATISTICS

-TABLE 6.1-
BIRTHS, DEATHS, MARRIAGES, AND MARITAL DISSOLUTIONS, 1970 THROUGH 1974

ITEM	1970	1971	1972	1973	1974
BIRTHS	249	238	204	221	231
DEATHS	97	86	100	110	107
MARRIAGES	66	75	77	77	87
MARITAL DISSOLUTIONS	55	49	76	62	46

-TABLE 6.2-
BIRTH, DEATH, MARRIAGE AND MARITAL DISSOLUTION RATES, 1970 THROUGH 1974

RATES (PER 1000 POPULATION)	1970	1971	1972	1973	1974
BIRTH	24.76	22.67	19.81	21.46	22.87
DEATH	9.65	8.19	9.71	10.68	10.59
MARRIAGE	6.56	7.14	7.48	7.48	8.61
MARITAL DISSOLUTION	5.47	4.67	7.38	6.02	4.55

-TABLE 6.3-
MARITAL STATUS OF ALL PERSONS, 14 YEARS OLD AND OLDER, 1970

ITEM	TOTAL	MALE	FEMALE
NEVER MARRIED	1738	988	750
MARRIED	4180	2080	2100
SEPARATED	86	32	54
WIDOWED	431	110	321
DIVORCED	256	114	142

SOURCES: TABLE 6.1 STATE DEPT OF HEALTH & ENVIRONMENTAL SCIENCES, MONTANA VITAL STATISTICS (ANNUAL)
TABLE 6.2 COMPUTED FROM MONTANA VITAL STATISTICS AND POPULATION ESTIMATES (TABLE 1.4)
TABLE 6.3 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, FIRST COUNT SUMM COMPUTER TAPES (PROCESSED) MONTANA DEPT CA

7. AGRICULTURE

-TABLE 7.1-
NUMBER OF FARMS, ACRES AND AVERAGE SIZE, 1969

	TOTAL FARMS	LAND IN FARMS	AVERAGE SIZE OF FARMS	COUNTY AREA	PERCENT OF LAND IN FARMS
COUNTY	540	2816994	5217	3214720	87.6%

-TABLE 7.2-
NUMBER OF FARMS BY TYPE OF PRODUCTS REPORTED, 1969

	CATTLE AND CALVES	HOGS	SHEEP	CHICKENS	MILK COWS	HORSES	CORN	WHEAT
NUMBER	445	109	48	101	112	272	27	268

-TABLE 7.3-
NUMBER OF FARMS BY ECONOMIC CLASS, 1969

	CLASS 1 $40000 & OVER	CLASS 2 $20000 -$39999	CLASS 3 $10000 -$19999	CLASS 4 $5000 -$9999	CLASS 5 $2500 -$4999	CLASS 6 $50- $2499	PART TIME	PART RETIRE	ABNORMAL
NUMBER	98	127	112	83	43	26	40	9	2

SOURCES: TABLE 7.1 US BUR OF THE CENSUS, CENSUS OF AG: 1969 (MONTANA AGRICULTURAL STATISTICS, VOL XIV)
TABLE 7.2 IBID
TABLE 7.3 IBID

PROFILES/AGRICULTURE/7.1,7.2,7.3

7. AGRICULTURE

TABLE 7.4
CASH RECEIPTS FROM SALE OF PRINCIPAL PRODUCTS AND GOVERNMENT PAYMENTS, 1970, 1971, 1972, AND 1973

YEAR	LIVESTOCK AND PRODUCTS	CROPS	RECEIPTS FROM MARKETING	GOVERNMENT PAYMENTS	ALL CASH RECEIPTS	CASH RECEIPTS PER FARM
1970	13474800	6087200	19562000	1857000	21419000	37511
1971	14393500	3588300	17981800	1317000	19298800	34586
1972	19229600	5803600	25033200	1195400	26228600	47516
1973	18002900	9377800	27380700	775600	28156300	51853

-TABLE 7.5-
ALL CROPS, IRRIGATED AND NOT IRRIGATED, ACRES HARVESTED AND VALUE OF CROP PRODUCTION, 1970, 1971, 1972, AND 1973

	IRRIGATED		NOT IRRIGATED	
YEAR	ACRES HARVESTED	VALUE OF CROP PRODUCTION	ACRES HARVESTED	VALUE OF CROP PRODUCTION
1970	40200	4096200	111700	3388200
1971	34910	2317300	122400	4404300
1972	52510	4888700	108800	5859500
1973	44310	8091400	130300	12216500

SOURCES: TABLE 7.4 MONTANA DEPT OF AG AND US DEPT OF AG, SRS, MONTANA AGRICULTURAL STATISTICS, VOL XIV, CO STATISTICS 1970-1971
TABLE 7.5 IBID

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BIG HORN COUNTY

8. LAND AND WATER USE

-TABLE 8.1-
LAND USE IN ACRES, 1967

CLASSIFICATION	ACRES	% OF TOTAL
TOTAL LAND AREA	3217626	100.0%
FEDERAL NON-CROPLAND	32062	1.0%
URBAN AND BUILT-UP	11979	0.4%
SMALL WATER AREAS	700	0.0%
AGRICULTURE	3172885	98.6%
CROPLAND	286480	8.9%
PASTURE	42430	1.3%
RANGE	2501257	77.7%
FOREST	331721	10.3%
OTHER	10997	0.3%

-TABLE 8.2-
LAND IN FARMS BY MAJOR USE, 1969

CLASSIFICATION	ACRES	% OF TOTAL
LAND IN FARMS	2816994	100.0%
CROPLAND	294794	10.5%
HARVESTED	152846	5.4%
PASTURED	26366	0.9%
ALL OTHER	115582	4.1%
WOODLAND	129356	4.6%
ALL OTHER LAND	2392844	84.9%

SOURCES: TABLE 8.1 MONTANA STATE CONSERVATION NEEDS COMMITTEE, MONTANA SOIL AND WATER CONSERVATION NEEDS INVENTORY, 1970
TABLE 8.2 US BUR OF THE CENSUS, CENSUS OF AG: 1969 (MONTANA AGRICULTURAL STATISTICS, VOL XIV)

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8. LAND AND WATER USE

-TABLE 8.3-
LAND USE, IRRIGATION, PASTURELAND, RANGELAND, AND CONSERVATION, 1969

	IRRIGATED LAND IN FARMS		FARMS WITH SALE OF PRODUCTS OVER $2500		
	FARMS	ACRES	PASTURE AND RANGELAND	LAND IN STRIP CROPPING	LAND IN SUMMER FALLOW
COUNT	256	48400	1898220	15876	89312

-TABLE 8.4-
AVERAGE WATER USE FOR IRRIGATION

	ACRES FULL SERVICE	ACRES PARTIAL SERVICE	ACRES FULL EQUIVALENT	DIVERSION REQUIREMENT (ACRES-FEET/YEAR)	NET DEPLETION (ACRES-FEET/YEAR)	RETURN FLOW (ACRES-FEET/YEAR)
COUNT	65569	0	65569	394334	185929	208405

SOURCES: TABLE 8.3 US BUR OF THE CENSUS, CENSUS OF AG: 1969 (MONTANA AGRICULTURAL STATISTICS, VOL XIV)
TABLE 8.4 WATER USE IN MONTANA, NO 13, DEPT OF NAT RES, 1975

PROFILES/LAND AND WATER USE/8.3,8.4

JUNE 1975

BIG HORN COUNTY

9. REVENUE

-TABLE 9.1-

ACRES AND ASSESSED VALUE OF IRRIGATED AND NON-IRRIGATED TILLABLE LANDS, 1970 TO 1974

	1970	1971	1972	1973	1974
IRRIGATED					
ACRES	38893	38920	38978	38977	39054
VALUE (DOLLARS)	2023237	2025497	2027737	2027502	2030434
AVERAGE VALUE	52.02	52.04	52.02	52.02	51.99
NON-IRRIGATED					
ACRES	106318	106327	106667	106703	108107
VALUE (DOLLARS)	2104245	2104019	2114530	2144680	2131791
AVERAGE VALUE	19.79	19.79	19.82	20.10	19.72

-TABLE 9.2-

ACRES AND ASSESSED VALUE OF GRAZING AND WILD HAY LANDS, 1970 TO 1974

	1970	1971	1972	1973	1974
GRAZING LAND					
ACRES	1282150	1282167	1286676	1286748	1281329
VALUE (DOLLARS)	5550477	5557175	5578494	5580615	5599782
AVERAGE VALUE	4.33	4.33	4.34	4.34	4.37
WILD HAY LAND					
ACRES	1203	1243	1203	1203	1203
VALUE (DOLLARS)	18420	18565	18420	18420	18880
AVERAGE VALUE	15.31	14.94	15.31	15.31	15.69

SOURCES: TABLE 9.1 REPORT OF THE MONTANA DEPARTMENT OF REVENUE, 1970 TO 1974
TABLE 9.2 IBID

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

9. REVENUE

-TABLE 9.3-

TOTAL OF ALL LANDS, ASSESSED VALUE AND IMPROVEMENTS, 1970 TO 1974

	1970	1971	1972	1973	1974
ALL LANDS					
ACRES	1428927	1429045	1433895	1433989	1430194
VALUE (DOLLARS)	9766525	9781377	9811927	9814037	9868242
AVERAGE VALUE	6.83	6.84	6.84	6.84	6.90
IMPROVEMENTS	4370328	4566408	4351102	3944421	6249575

-TABLE 9.4-

ASSESSED AND TAXABLE PROPERTY VALUATION, 1970 TO 1974

	1970	1971	1972	1973	1974
ASSESSED VALUE	48219519	50226555	51698246	57467988	77405874
TAXABLE VALUE	13493182	13995501	14479872	15819457	29412823

SOURCES: TABLE 9.3 REPORT OF THE MONTANA DEPT OF REVENUE, 1970 TO 1974
TABLE 9.4 IBID

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

IG HORN COUNTY

9. REVENUE

-TABLE 9.5-

TAXES LEVIED FOR STATE PURPOSES, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL OF ALL STATE TAXES	135247	114341	113136	318615	299739
UNIVERSITY MILLAGE	80959	83572	86879	94916	176476
OTHER PROPERTY	30840	6350	266	191538	76540
LIVESTOCK, SHEEP, OTHER	23448	24019	25991	32161	46723

-TABLE 9.6-

TAXES LEVIED FOR COUNTY PURPOSES, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL MILLS ALL PURPOSES	32.05	44.15	44.28	42.22	26.72
TOTAL TAXES LEVIED	398462	562816	612523	643383	837808
GENERAL FUND	193283	235399	276038	298816	348236
ROAD FUND	68653	107379	123051	139986	220758
BRIDGE FUND	29746	30470	35832	24762	56623
POOR FUND	53142	50836	48923	68544	63917
BOND INTEREST & SINKING	11137	70515	26498	8461	19556
COUNTY FAIR	20240	20596	21720	23730	44119
COUNTY LIBRARY	15597	19741	32957	42236	52046
AG EXTENSION SERVICE	0	0	0	0	0
CLASSIFICATION & APPRAISAL	2997	4674	10740	2532	0
OTHER	3657	22806	36764	34316	40553

SOURCES: TABLE 9.5 REPORT OF THE MONTANA DEPT OF REVENUE, 1970 TO 1974
TABLE 9.6 IBID

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

9. REVENUE

-TABLE 9.7-

TOTAL PROPERTY TAXES BILLED FOR PUBLIC SERVICES, FY 1970 TO FY 1975

	FY 1970	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975
TOTAL PROPERTY TAXES	1679898	1835144	2258126	2326491	2629866	3615618
COUNTY PURPOSE TAXES	349093	398462	562816	612523	643383	837808
PUBLIC SCHOOL TAXES	932309	1012819	1284691	1296022	1482413	2096288
CITY AND TOWN TAXES	173390	190884	194566	209260	230916	308907
STATE PROPERTY TAXES	130664	135247	114341	113136	165386	238507
MISCELLANEOUS TAXES	94442	97732	101712	95550	107768	134108

-TABLE 9.8-

MILL LEVIES FOR COUNTY OPERATIONS, FY 1971 TO FY 1974

	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975
TOTAL MILLS	30.93	44.15	44.28	42.22	26.72
GENERAL FUND	14.50	17.26	19.47	18.75	10.06
ROAD	6.26	10.11	10.53	10.86	7.92
BRIDGE	2.37	2.14	2.55	1.33	2.05
POOR	4.06	3.55	3.34	4.57	1.67
EXTENSION AGENT	0.0	0.0	0.0	0.0	0.0
FAIR	1.50	1.50	1.50	1.50	1.50
LIBRARY	0.0	1.46	2.46	2.72	1.57
AIRPORT	1.15	0.05	0.13	0.09	0.05
CEMETARY	0.0	0.0	0.0	0.0	0.0
DEBT LEVY	0.0	6.00	0.89	0.45	0.71
OTHER	1.09	2.08	3.41	1.95	1.19

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10. SOCIAL WELFARE STATISTICS

-TABLE 10.3-

NUMBER OF BENEFICIARIES OF OLD AGE, SURVIVORS, DISABILITY AND HEALTH INSURANCE, BY AGE, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL	1045	1056	1081	1180	1190
UNDER AGE 60	389	374	407	440	445
AGE 60 AND OVER	656	682	674	740	745
UNDER AGE 65	477	487	517	565	585
AGE 65 AND OVER	568	569	564	615	605

-TABLE 10.4-

NUMBER OF PERSONS ENROLLED IN HEALTH INSURANCE PROGRAMS AND TOTAL REIMBURSEMENT FOR HOSPITAL AND MEDICAL INSURANCE (MEDICARE), 1970 TO 1972

	1970	1971	1972
HOSPITAL AND/OR MEDICAL INURANCE			
NUMBER ENROLLED	669	661	659
AMOUNT REIMBURSED	146552	163152	176183
HOSPITAL INSURANCE			
NUMBER ENROLLED	664	656	654
AMOUNT REIMBURSED	110190	123311	131006
SUPPLEMENTARY MEDICAL INSURANCE			
NUMBER ENROLLED	606	601	601
AMOUNT REIMBURSED	36362	39841	45177

SOURCES: TABLE 10.3 PUBLICATION RS:S-2.14, DEPARTMENT OF HEW
TABLE 10.4 DHEW PUBLICATION NO SSA 75:11704

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY ********** 10. SOCIAL WELFARE STATISTICS **********

-TABLE 10.1-

NUMBER OF BENEFICIARIES OF OLD AGE, SURVIVORS, DISABILITY AND HEALTH INSURANCE, BY TYPE, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL	1045	1056	1081	1175	1180
RETIRED WORKERS	429	457	450	505	500
DEPENDENTS	130	139	133	140	135
DISABLED WORKERS	45	51	50	65	80
DEPENDENTS	44	38	57	75	85
SURVIVORS	367	345	370	375	370
SPECIAL AGE 72 BENEFICIARIES	30	26	21	15	10

-TABLE 10.2-

AMOUNT ($000) OF MONTHLY BENEFITS PAID TO BENEFICIARIES OF OLD AGE, SURVIVORS, DISABILITY AND HEALTH INSURANCE, BY TYPE, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL (THOUSANDS OF DOLLARS)	88	99	122	137	156
RETIRED WORKERS	48	57	69	78	88
DISABLED WORKERS	5	7	8	11	14
ALL OTHER BENEFICIARIES	35	35	45	48	54

SOURCES: TABLE 10.1 PUBLICATION RS:S-2.13, DEPARTMENT OF HEW
TABLE 10.2 IBID

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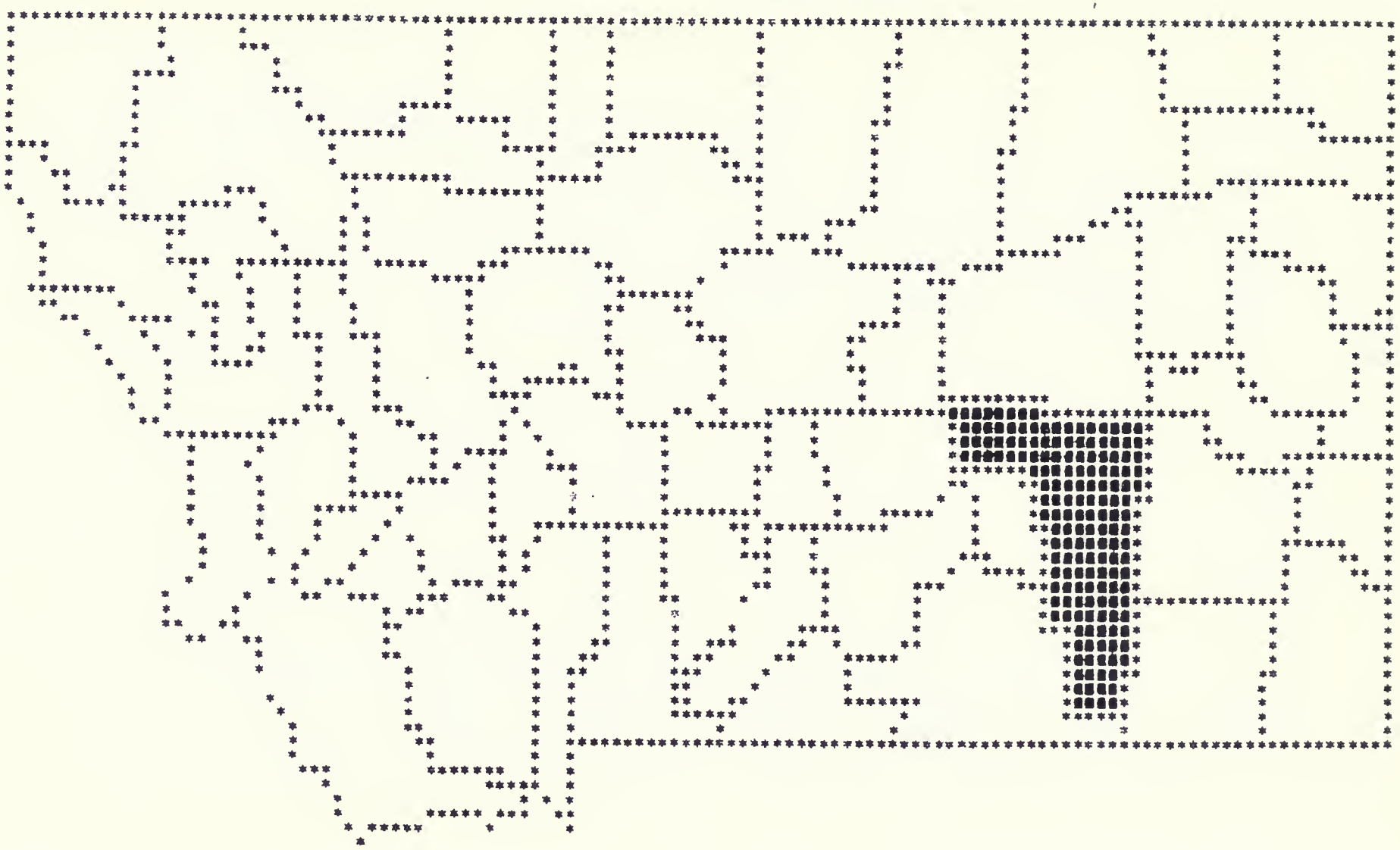

ROSEBUD COUNTY

PROFILES
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MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

BIG HORN COUNTY

10. SOCIAL WELFARE STATISTICS

-TABLE 10.5-

AID TO DEPENDENT CHILDREN AND MEDICAL ASSISTANCE, MARCH OF EACH YEAR, 1970 TO 1975

	MARCH 1970	MARCH 1971	MARCH 1972	MARCH 1973	MARCH 1974	MARCH 1975
AID TO DEPENDENT CHILDREN						
NUMBER OF FAMILIES	99	113	127	134	118	150
NUMBER OF CHILDREN	255	297	309	294	249	0
AMOUNT REIMBURSED	13491	14241	15461	15723	14512	19338
AVERAGE PER FAMILY	136.27	126.03	121.74	117.34	122.98	128.92
MEDICAL ASSISTANCE						
NUMBER OF CASES	105	94	122	145	89	152
PAYMENTS	7466	5175	14006	15754	12468	31117

-TABLE 10.6-

TOTAL VALUE OF FOOD STAMPS, AVERAGE VALUE PER RECIPIENT, MARCH OF EACH YEAR, 1971 TO 1975

	MARCH 1971	MARCH 1972	MARCH 1973	MARCH 1974	MARCH 1975
TOTAL VALUE	3802	4442	3453	3042	17231
AVERAGE PER HOUSEHOLD	59	88	92	98	109
AVERAGE PER PERSON	14	24	26	33	36
VALUE OF BONUS FOOD STAMPS	2168	2423	1624	1633	12203
AVERAGE (BONUS STAMPS PER HOUSEHOLD)	33	48	38	52	77
AVERAGE (BONUS STAMPS PER PERSON)	8	13	12	17	25

SOURCES: TABLE 10.5 STATISTICAL REPORT, MONTANA DEPT OF SRS
TABLE 10.6 IBID

JUNE 1975

PROFILES/SOCIAL WELFARE STATISTICS/10.5,10.6

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PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

ROSEBUD COUNTY

GENERAL INFORMATION

DATE OF ORGANIZATION: MARCH 1, 1901

CONGRESSIONAL DISTRICT: 2

PLANNING DISTRICT: 3

LAND AREA: 5037 SQ MILES

ROADS AND STREETS:

RURAL MILEAGE - 1665
MUNICIPAL MILEAGE - 18

NEWSPAPERS:

DAILY - 0
WEEKLY - 1

INCORPORATED PLACES:

PLACES: FORSYTH 1970 CENSUS: 1873

PUBLIC USE AIRPORTS: 1

BANKS: 2

HOSPITALS: 1

CLASS OF COUNTY: 3

VALUATION:

ASSESSED - 72282308 DOLLARS
TAXABLE - 25866296 DOLLARS

BROADCAST STATIONS:

RADIO - 0
TV - 0

LIBRARIES:

PUBLIC - 1
INSTITUTIONAL AND SPECIAL - 0
SCHOOL - 5

SPECIAL NOTES: THE COUNTY SEAT IS FORSYTH.
THE NORTHERN CHEYENNE INDIAN RESERVATION IS PARTLY IN ROSEBUD COUNTY.
LAME DEER IS THE HEADQUARTERS OF THE CHEYENNE RESERVATION.

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

RES END COUNTY

* 1. POPULATION *

-TABLE 1.1-
URBAN AND RURAL CLASSIFICATION, 1960 AND 1970

	1960		1970		
ITEM	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	% CHANGE 1960 TO 1970
URBAN	0	0.0%	0	0.0%	-- --
RURAL	6187	100.0%	6032	100.0%	-2.5%
RURAL FARM	1559	25.2%	1512	25.1%	-3.0%
RURAL NON-FARM	4628	74.8%	4520	74.9%	-2.3%

(RURAL FARM AND NON-FARM DATA BASED ON SAMPLE)

-TABLE 1.2-
RACE CLASSIFICATION, 1960 AND 1970

	1960		1970		
ITEM	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	% CHANGE 1960 TO 1970
WHITE	4834	78.1%	4203	69.7%	-13.1%
NON-WHITE	1353	21.9%	1829	30.3%	35.2%
INDIAN	1344	21.7%	1820	30.2%	35.4%
OTHER NON-WHITE	9	0.1%	9	0.1%	0.0%

-TABLE 1.3-
TOTAL POPULATION BY SEX, 1940, 1950, 1960, AND 1970

	1940	1950		1960		1970	
SEX	NUMBER	NUMBER	% CHANGE FROM 1940	NUMBER	% CHANGE FROM 1950	NUMBER	% CHANGE FROM 1960
MALE	3485	3560	2.2%	3201	-10.1%	3051	-4.7%
FEMALE	2992	3010	0.6%	2986	-0.8%	2981	-0.2%
TOTAL	6477	6570	1.4%	6187	-5.8%	6032	-2.5%

SOURCE: TABLE 1.1 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA
TABLE 1.2 IBID
TABLE 1.3 US CENSUS OF POP: 1940, 1950, VOL II, CHAR OF THE POP; 1960, 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

[illegible] COUNTY

* 1. P O P U L A T I O N *

-TABLE 1.4-
TOTAL POPULATION, ESTIMATES FOR 1971,1972,1973 AND 1974

1971		1972		1973		1974	
NUMBER	% CHANGE FROM 1970	NUMBER	% CHANGE FROM 1971	NUMBER	% CHANGE FROM 1972	NUMBER	% CHANGE FROM 1973
6100	1.1%	6400	4.9%	6900	7.8%	7700	11.6%

(1974 ESTIMATES ARE PROVISIONAL)

-TABLE 1.5-
TOTAL POPULATION, PROJECTED TO 1975 AND 1980, UNDER 3 ALTERNATIVE MIGRATION ASSUMPTIONS

CONTINUED 1960-1970 MIGRATION TRENDS TO 1980		NO NET MIGRATION FROM 1970 TO 1980		CONTINUED 1970-1973 MIGRATION TRENDS TO 1980	
1975	1980	1975	1980	1975	1980
6012	5930	6441	7064	6996	9385

-TABLE 1.6-
NET MIGRATION, 1950 TO 1960, AND 1960 TO 1970

NET MIGRATION 1950 TO 1960	NET MIGRATION 1960 TO 1970	% CHANGE BETWEEN DECENNIA
-1496	-697	40.0%

SOURCES: TABLE 1.4 US BUR OF THE CENSUS, CURRENT POP REPORTS, SERIES P-26, NOS 19, 53
TABLE 1.5 MONTANA DEPT OF ISC, DIV OF RESEARCH & INFORMATION SYS, MONTANA POP PROJECTIONS (UNPUBLISHED)
TABLE 1.6 US BUR OF THE CENSUS, COUNTY AND CITY DATA BOOK, 1967, 1972

[illegible] FILES/POPULATION/1.4,1.5,1.6

JUNE 1975

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

COUNTY

1. POPULATION

-TABLE 1.7-
TOTAL POPULATION BY SEX AND AGE FOR 1960 AND 1970

SEX/AGE GROUPS	1960 NUMBER	1960 % OF TOTAL	1970 NUMBER	1970 % OF TOTAL	% CHANGE 1960 TO 1970
MALE					
UNDER 5	419	13.1%	298	9.8%	-28.9%
5-17	904	28.2%	918	30.1%	1.5%
5 YEAR OLDS	93	2.9%	65	2.1%	-30.1%
18-64	1526	47.7%	1531	50.2%	0.3%
18 YEAR OLDS	39	1.2%	38	1.2%	-2.6%
65 AND OVER	352	11.0%	304	10.0%	-13.6%
ALL AGES	3201	100.0%	3051	100.0%	-4.7%
FEMALE					
UNDER 5	387	13.0%	311	10.4%	-19.6%
5-17	859	28.8%	864	29.0%	0.6%
5 YEAR OLDS	77	2.6%	73	2.4%	-5.2%
18-64	1449	48.5%	1496	50.2%	3.2%
18 YEAR OLDS	38	1.3%	52	1.7%	36.8%
65 AND OVER	291	9.7%	310	10.4%	6.5%
ALL AGES	2986	100.0%	2981	100.0%	-0.2%
TOTAL					
UNDER 5	806	13.0%	609	10.1%	-24.4%
5-17	1763	28.5%	1782	29.5%	1.1%
5 YEAR OLDS	170	2.7%	138	2.3%	-18.8%
18-64	2975	48.1%	3027	50.2%	1.7%
18 YEAR OLDS	77	1.2%	90	1.5%	16.9%
65 AND OVER	643	10.4%	614	10.2%	-4.5%
ALL AGES	6187	100.0%	6032	100.0%	-2.5%

SOURCE: TABLE 1.7 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

JUNE 1975

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

ROSEBUD COUNTY

2. EMPLOYMENT

TABLE 2.1-
EMPLOYMENT STATUS BY SEX, SIXTEEN YEARS OLD AND OVER, 1970

	TOTAL	MALE		FEMALE	
STATUS	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
COUNT	3928	1972	50.2%	1956	49.8%
LABOR FORCE	2346	1505	64.2%	841	35.8%
CIVILIAN LABOR FORCE	2346	1505	64.2%	841	35.8%
EMPLOYED	2238	1436	64.2%	802	35.8%
UNEMPLOYED	108	69	63.9%	39	36.1%
NOT IN LABOR FORCE	1582	467	29.5%	1115	70.5%
ENROLLED IN SCHOOL	191	76	39.8%	115	60.2%

-TABLE 2.2-
EMPLOYMENT STATUS BY SEX, FOURTEEN YEARS OLD AND OVER, 1960

	TOTAL	MALE		FEMALE	
STATUS	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
COUNT	4071	2108	51.8%	1963	48.2%
LABOR FORCE	2274	1615	71.0%	659	29.0%
CIVILIAN LABOR FORCE	2269	1610	71.0%	659	29.0%
EMPLOYED	2118	1517	71.6%	601	28.4%
UNEMPLOYED	151	93	61.6%	58	38.4%
NOT IN LABOR FORCE	1797	493	27.4%	1304	72.6%
ENROLLED IN SCHOOL	352	184	52.3%	168	47.7%

SOURCES: TABLE 2.1 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA
TABLE 2.2 US CENSUS OF POP: 1960, VOL I, CHAR OF THE POP, PT 28, MONTANA

PROFILES/EMPLOYMENT/2.1,2.2

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SCOBEY COUNTY

2. EMPLOYMENT

-TABLE 2.3-
EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES, FULL AND PART TIME WAGE AND SALARY EMPLOYMENT, PLUS THE NUMBER OF PROPRIETORS, 1968 THROUGH 1972

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL EMPLOYMENT	2544	2586	2550	2782	2909
NUMBER OF PROPRIETORS	663	730	732	737	734
FARM	430	428	423	417	410
NON-FARM	233	302	309	320	324
WAGE AND SALARY EMPLOYMENT	1881	1776	1818	2045	2175
FARM	207	263	263	286	286
NON-FARM	1614	1513	1555	1759	1889
GOVERNMENT	445	431	439	455	470
TOTAL FEDERAL	131	117	108	111	119
FEDERAL CIVILIAN	130	117	108	111	119
MILITARY	1	0	0	0	0
STATE AND LOCAL	314	314	331	344	351
PRIVATE NON-FARM	1169	1082	1116	1304	1419
MANUFACTURING	WITHHELD	200	WITHHELD	WITHHELD	WITHHELD
MINING	WITHHELD	WITHHELD	WITHHELD	WITHHELD	WITHHELD
CONSTRUCTION	52	55	29	25	39
TRANSP,COMM,PUB UTIL	207	204	207	208	206
TRADE	256	214	212	238	263
FINANCE,INSUR,REAL ESTATE	21	19	19	25	36
SERVICES	454	343	387	496	501
OTHER	6	WITHHELD	6	5	6

SOURCES: TABLE 2.3 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)
PROFILES/EMPLOYMENT/2.3

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[illegible] COUNTY

2. EMPLOYMENT

-TABLE 2.4-
EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES, FULL AND PART TIME WAGE AND SALARY EMPLOYMENT, PLUS THE NUMBER OF PROPRIETORS, 1968 THROUGH 1972, AS A PERCENT OF TOTAL EMPLOYMENT

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL EMPLOYMENT	100.0%	100.0%	100.0%	100.0%	100.0%
NUMBER OF PROPRIETORS	26.1%	29.1%	28.7%	26.5%	25.2%
FARM	16.9%	17.1%	16.8%	15.0%	14.1%
NON-FARM	9.2%	12.1%	12.1%	11.5%	11.1%
WAGE AND SALARY EMPLOYMENT	73.9%	70.9%	71.3%	73.5%	74.8%
FARM	10.5%	10.5%	10.3%	10.3%	9.8%
NON-FARM	63.4%	60.4%	61.0%	63.2%	64.9%
GOVERNMENT	17.5%	17.2%	17.2%	16.4%	16.2%
TOTAL FEDERAL	5.1%	4.7%	4.2%	4.0%	4.1%
FEDERAL CIVILIAN	5.1%	4.7%	4.2%	4.0%	4.1%
MILITARY	0.0%	0.0%	0.0%	0.0%	0.0%
STATE AND LOCAL	12.3%	12.5%	13.0%	12.4%	12.1%
PRIVATE NON-FARM	46.0%	43.2%	43.8%	46.9%	48.8%
MANUFACTURING	0.0%	8.0%	0.0%	0.0%	0.0%
MINING	0.0%	0.0%	0.0%	0.0%	0.0%
CONSTRUCTION	2.0%	2.2%	1.1%	0.9%	1.3%
TRANSP,COMM,PUB UTIL	8.1%	8.1%	8.1%	7.5%	7.1%
TRADE	10.1%	8.5%	8.3%	8.6%	9.0%
FINANCE,INSUR,REAL ESTATE	0.8%	0.8%	0.7%	0.9%	1.2%
SERVICES	17.8%	13.7%	15.2%	17.8%	17.2%
OTHER	0.2%	0.0%	0.2%	0.2%	0.2%

SOURCES: TABLE 2.4 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)

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MONTANA DEPARTMENT OF COMMUNITY AFFAIRS

ROSEBUD COUNTY

2. EMPLOYMENT

-TABLE 2.5-
EMPLOYMENT BY OCCUPATION, BY SEX, 16 YEARS OLD AND OVER, 1970

OCCUPATION	TOTAL	MALE		FEMALE	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
TOTAL EMPLOYED	2238	1436	64.2%	802	35.8%
PROFESSIONAL AND TECHNICAL	234	106	45.3%	128	54.7%
MANAGERS AND ADMINISTRATORS (NON-FARM)	204	176	86.3%	28	13.7%
SALES WORKERS	57	34	59.6%	23	40.4%
CLERICAL	304	62	20.4%	242	79.6%
CRAFTSMEN AND FOREMEN	184	184	100.0%	0	0.0%
OPERATIVES	218	158	72.5%	60	27.5%
LABORERS (NON-FARM)	141	113	80.1%	28	19.9%
FARMERS AND FARM MANAGERS	306	283	92.5%	23	7.5%
FARM LABORERS AND FOREMEN	191	181	94.8%	10	5.2%
SERVICE WORKERS	386	139	36.0%	247	64.0%
PRIVATE HOUSEHOLD WORKERS	13	0	0.0%	13	100.0%

SOURCES: TABLE 2.5 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, VOL I, CHAR OF THE POP, PT 28, MONTANA

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ROSEBUD COUNTY

2. EMPLOYMENT

-TABLE 2.6-
EMPLOYMENT BY OCCUPATION, BY SEX, TOTAL EMPLOYED, 1960

OCCUPATION	TOTAL	MALE		FEMALE	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
TOTAL EMPLOYED	2118	1517	71.6%	601	28.4%
PROFESSIONAL AND TECHNICAL	209	98	46.9%	111	53.1%
MANAGERS AND ADMINISTRATORS (NON-FARM)	172	138	80.2%	34	19.8%
SALES WORKERS	77	26	33.8%	51	66.2%
CLERICAL	218	75	34.4%	143	65.6%
CRAFTSMEN AND FOREMEN	197	193	98.0%	4	2.0%
OPERATIVES	187	148	79.1%	39	20.9%
LABORERS (NON-FARM)	99	95	96.0%	4	4.0%
FARMERS AND FARM MANAGERS	345	336	97.4%	9	2.6%
FARM LABORERS AND FOREMEN	321	311	96.9%	10	3.1%
SERVICE WORKERS	243	97	39.9%	146	60.1%
PRIVATE HOUSEHOLD WORKERS	42	0	0.0%	42	100.0%

SOURCES: TABLE 2.6 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, VOL 1, CHAR OF THE POP, PT 28, MONTANA

PROFILES
DIVISION OF RESEARCH AND INFORMATION SYSTEMS
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[illegible] COUNTY

3. PERSONAL INCOME

-TABLE 3.1-
PERSONAL INCOME BY MAJOR SOURCES AND EARNINGS BY BROAD INDUSTRIAL SECTOR IN THOUSANDS OF DOLLARS, 1968 THROUGH 1972

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL PERSONAL INCOME	15456	17390	19054	21067	24191
TOTAL WAGES AND SALARIES	8266	9239	9764	11044	12332
OTHER LABOR INCOME	438	525	605	690	816
PROPRIETORS INCOME	3231	3800	4467	4836	6264
FARM PROPRIETORS INCOME	2107	2641	3260	3721	5121
NON-FARM PROPRIETORS INCOME	1124	1159	1207	1115	1143
PROPERTY INCOME	2233	2515	2714	2876	3045
TRANSFER PAYMENTS	1763	1911	2181	2395	2478
LESS: PERSONAL CONTRIBUTIONS	515	600	657	774	744
TOTAL EARNINGS	11955	13564	14636	16570	19412
FARM EARNINGS	2989	3632	4271	4882	6403
NON-FARM EARNINGS	8966	9932	10565	11688	13009
GOVERNMENT EARNINGS	2424	2459	2594	2993	3302
TOTAL FEDERAL	1075	1016	1015	1203	1355
FEDERAL CIVILIAN	999	942	931	1113	1255
MILITARY	76	74	84	90	100
STATE AND LOCAL	1349	1443	1579	1790	1947
PRIVATE NON-FARM EARNINGS	6542	7473	7971	8695	9707
MANUFACTURING	WITHHELD	983	WITHHELD	WITHHELD	WITHHELD
MINING	WITHHELD	WITHHELD	WITHHELD	WITHHELD	WITHHELD
CONTRACT CONSTRUCTION	356	498	325	205	393
TRANSP, COMM, AND PUB UTIL	1721	1839	1901	2082	2204
WHOLESALE AND RETAIL TRADE	1320	1166	1233	1371	1471
FINANCE, INS, REAL ESTATE	158	156	148	196	258
SERVICES	1975	2172	2362	2515	2655
OTHER	104	WITHHELD	108	136	129

SOURCES: TABLE 3.1 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)

PROFILES/PERSONAL INCOME/3.1

PROFILES
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* 3. P E R S O N A L I N C O M E *

-TABLE 3.2-
PERSONAL INCOME BY MAJOR SOURCES AS A PERCENT OF TOTAL PERSONAL INCOME,
AND EARNINGS BY BROAD INDUSTRIAL SECTOR AS A PERCENT OF TOTAL EARNINGS, 1968 THROUGH 1972

CLASSIFICATION	1968	1969	1970	1971	1972
TOTAL PERSONAL INCOME	100.0%	100.0%	100.0%	100.0%	100.0%
TOTAL WAGES AND SALARIES	53.6%	53.1%	51.1%	52.4%	51.0%
OTHER LABOR INCOME	2.8%	3.0%	3.2%	3.3%	3.4%
PROPRIETORS INCOME	20.9%	21.9%	23.4%	23.[illegible]%	25.9%
FARM PROPRIETORS INCOME	13.6%	15.2%	17.1%	17.7%	21.2%
NON-FARM PROPRIETORS INCOME	7.3%	6.7%	6.3%	5.3%	4.7%
PROPERTY INCOME	14.4%	14.5%	14.2%	13.7%	12.6%
TRANSFER PAYMENTS	11.5%	11.0%	11.4%	11.4%	10.2%
LESS: PERSONAL CONTRIBUTIONS	3.3%	3.5%	3.3%	3.7%	3.1%
TOTAL EARNINGS	100.0%	100.0%	100.0%	100.0%	100.0%
FARM EARNINGS	25.0%	26.8%	28.8%	29.5%	33.0%
NON-FARM EARNINGS	75.0%	73.2%	71.2%	70.5%	67.0%
GOVERNMENT EARNINGS	20.3%	18.1%	17.5%	16.1%	17.0%
TOTAL FEDERAL	9.0%	7.5%	6.8%	7.3%	7.0%
FEDERAL CIVILIAN	8.4%	6.9%	6.3%	6.7%	6.5%
MILITARY	0.6%	0.5%	0.6%	0.5%	0.5%
STATE AND LOCAL	11.3%	10.6%	10.6%	10.8%	10.0%
PRIVATE NON-FARM EARNINGS	54.7%	55.1%	53.7%	52.5%	50.0%
MANUFACTURING	8.0%	7.2%	6.0%	6.0%	6.0%
MINING	0.9%	0.9%	0.[illegible]%	0.9%	0.9%
CONTRACT CONSTRUCTION	3.0%	3.7%	2.2%	1.2%	2.0%
TRANSP, COMM, AND PUB UTIL	14.4%	13.6%	13.2%	12.6%	11.4%
WHOLESALE AND RETAIL TRADE	11.0%	8.6%	8.3%	8.3%	7.6%
FINANCE, INS, REAL ESTATE	1.3%	1.2%	1.0%	1.2%	1.3%
SERVICES	16.5%	16.0%	15.9%	15.2%	13.7%
OTHER	0.9%	0.0%	1.2%	0.8%	0.7%

SOURCES: TABLE 3.2 US BUR OF ECON ANALYSIS, BEIS (UNPUBLISHED)

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ROSEBUD COUNTY

3. PERSONAL INCOME

-TABLE 3.3-
PER CAPITA PERSONAL INCOME, RESIDENCE ADJUSTED, IN DOLLARS, 1967 THROUGH 1973

ITEM	1967	1968	1969	1970	1971	1972	1973
PER CAPITA INCOME (DOLLARS)	2413	2610	2932	3438	3699	4073	4724

-TABLE 3.4-
MEDIAN FAMILY INCOME, 1949, 1959, 1969

ITEM	1949	1959		1969	
	NUMBER	NUMBER	% CHANGE FROM 1949	NUMBER	% CHANGE FROM 1959
MEDIAN FAMILY INCOME (DOLLARS)	2524	4399	74.3%	6714	52.6%

-TABLE 3.5-
FAMILIES WITH INCOME LESS THAN POVERTY LEVEL, LESS THAN 75% OF POVERTY LEVEL, AND LESS THAN 125% OF POVERTY LEVEL, 1969

ITEM	INCOME LESS THAN POVERTY LEVEL		INCOME LESS THAN 75% OF POVERTY LEVEL		INCOME LESS THAN 125% OF POVERTY LEVEL	
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
FAMILIES	301	20.0%	220	14.6%	387	25.7%
UNRELATED INDIVIDUALS	176	35.2%	138	27.6%	262	52.4%
PERSONS	1519	25.8%	1107	18.8%	1943	32.9%

SOURCES: TABLE 3.3 US BUR OF ECON ANALYSIS, REIS (UNPUBLISHED)
TABLE 3.4 US BUR OF THE CENSUS, US CENSUS OF POP: 1950, VOL II, CHAP OF THE POP, PT 26, MONTANA; 1960, 1970, VOL I, PT
TABLE 3.5 US CENSUS OF POP: 1970, VOL I, CHAP OF THE POP, PT 28, MONTANA

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ROSEBUD COUNTY

3. PERSONAL INCOME

-TABLE 3.6-
NUMBER OF FAMILIES BY INCOME LEVELS, 1959 AND 1969

FAMILY INCOME	NUMBER OF FAMILIES 1959	% OF TOTAL	1969	% OF TOTAL	% CHANGE 1959 TO 1969
ALL FAMILIES	1394	100.0%	1507	100.0%	8.1%
UNDER $1000	103	7.4%	77	5.1%	-25.2%
$1000 TO $1999	168	12.1%	86	5.7%	-48.8%
$2000 TO $2999	169	12.1%	110	7.3%	-34.9%
$3000 TO $3999	178	12.8%	69	4.6%	-61.2%
$4000 TO $4999	198	14.2%	113	7.5%	-42.9%
$5000 TO $5999	139	10.0%	158	10.5%	13.7%
$6000 TO $6999	102	7.3%	196	13.0%	92.2%
$7000 TO $7999	85	6.1%	120	8.0%	41.2%
$8000 TO $8999	111	8.0%	121	8.0%	9.0%
$9000 TO $9999	16	1.1%	83	5.5%	418.8%
$10000 TO $14999	104	7.5%	245	16.3%	135.6%
$15000 TO $24999	17	1.2%	104	6.9%	511.8%
$25000 AND OVER	4	0.3%	25	1.7%	525.0%

SOURCES: TABLE 3.6 US BUR OF THE CENSUS, US CENSUS OF POP: 1960, 1970, VOL I, CHAR OF THE POP, PT 26, MONTANA

4. HOUSING

-TABLE 4.1-
COUNT OF HOUSING UNITS BY OCCUPANCY AND VACANCY STATUS, 1970

ITEM	OCCUPIED		VACANT				
			FOR RENT		FOR SALE		OTHER
	BY OWNER	BY RENTER	NUMBER	RATE	NUMBER	RATE	NUMBER
HOUSING UNITS	1156	661	31	4.5%	9	0.8%	162

-TABLE 4.2-
PERSONS PER ROOM FOR OWNER AND RENTER OCCUPIED UNITS, 1970

PERSONS PER ROOM	TOTAL	OWNER OCCUPIED	RENTER OCCUPIED
1.00 OR LESS	1494	939	555
1.01 - 1.50	157	99	58
1.51 OR MORE	166	118	48

-TABLE 4.3-
COUNT OF SELECTED RENTER-OCCUPIED UNITS BY MONTHLY RENT IN DOLLARS, 1970

DOLLAR RANGE	TOTAL	WITH ALL PLUMBING FACILITIES	LACKING ONE OR MORE PLUMBING FACILITIES
LESS THAN $40	104	68	36
$40 - $59	164	146	18
$60 - $79	128	125	3
$80 - $99	18	18	0
$100 - $149	8	8	0
$150 - $199	0	0	0
$200 OR MORE	1	1	0

SOURCES: TABLE 4.1 US BUR OF THE CENSUS, US CENSUS OF HOUSING: 1970, FIRST COUNT SUMM COMPUTER TAPES, MONTANA DEPT OF IGR
TABLE 4.2 IBID
TABLE 4.3 IBID

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4. HOUSING

-TABLE 4.4-
COUNT OF OWNER-OCCUPIED UNITS FOR WHICH DOLLAR VALUE IS TABULATED, 1970

DOLLAR VALUE	COUNT OF OWNER-OCCUPIED UNITS	
	NUMBER	% OF TOTAL
TOTAL COUNT	631	100.0%
LESS THAN $5000	202	32.0%
$5000 - $9999	196	31.1%
$10000 - $14999	116	18.4%
$15000 - $19999	68	10.8%
$20000 - $24999	27	4.3%
$25000 - $34999	20	3.2%
$35000 - $49999	2	0.3%
$50000 AND OVER	0	0.0%

-TABLE 4.5-
HOUSEHOLDS BY TYPE AND INCOME, 1970

TYPE	LESS THAN $5000	$5000 TO $9999	$10000 TO $14999	$15000 OR MORE
HUSBAND-WIFE FAMILY	285	109	18	60
OTHER FAMILY	596	145	5	19
PRIMARY INDIVIDUAL	206	36	333	5

-TABLE 4.6-
OCCUPIED UNITS BY TYPE AND PLUMBING FACILITIES, 1970

FACILITIES	TOTAL	OWNER		RENTER	
	NUMBER	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL
WITH ALL PLUMBING FACILITIES	1491	936	62.8%	555	37.2%
LACKING ONE OR MORE PLUMBING FACILITIES	326	220	67.5%	106	32.5%

SOURCES: TABLE 4.4 US BUR OF THE CENSUS, US CENSUS OF HOUSING: 1970, FIRST COUNT SUMM COMPUTER TAPES, MONTANA DEPT OF IGR
TABLE 4.5 IBID
TABLE 4.6 IBID

ROSEBUD COUNTY

5. EDUCATION

-TABLE 5.1-
TOTAL SCHOOL ENROLLMENT, PUBLIC AND NON-PUBLIC, 1968-69 THROUGH 1974-75

CLASSIFICATION	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
PUBLIC							
ALL GRADES	1291	1333	1345	1398	1428	1601	1763
ELEMENTARY	940	1015	1014	1055	1067	1173	1305
HIGH SCHOOL	351	318	331	343	361	428	458
NON-PUBLIC							
ALL GRADES	470	466	576	534	554	594	560
ELEMENTARY	349	331	390	344	358	397	370
HIGH SCHOOL	121	135	186	190	196	197	190
TOTAL							
ALL GRADES	1761	1799	1921	1932	1982	2195	2323
ELEMENTARY	1289	1346	1404	1399	1425	1570	1675
HIGH SCHOOL	472	453	517	533	557	625	648

-TABLE 5.2-
SCHOOL CENSUS DATA, 1968-69 THROUGH 1972-73

AGES	1968-69	1969-70	1970-71	1971-72	1972-73
TOTAL	2819	2822	2874	2985	3182
UNDER 6	688	677	685	777	843
6 - 20	2131	2145	2189	2208	2334

SOURCES: TABLE 5.1 OFFICE OF THE SUPT OF PUBLIC INSTRUCTION, MONTANA, MONTANA SCHOOL STATISTICS
TABLE 5.2 IBID

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5. EDUCATION

-TABLE 5.3-
EDUCATIONAL ATTAINMENT BY SEX AGED 25 YEARS OR MORE, 1970

YEARS OF SCHOOL COMPLETED	MALE	FEMALE
ELEMENTARY	339	253
HIGH SCHOOL	488	464
COLLEGE	110	106
MEDIAN SCHOOL YEARS COMPLETED	11.1	11.9
PERCENT HIGH SCHOOL GRADUATES	44.0	49.1

-TABLE 5.4-
MEDIAN SCHOOL YEARS COMPLETED, 1950, 1960 AND 1970

ITEM	1950	1960	1970
MEDIAN SCHOOL YEARS COMPLETED	9.0	10.5	11.5

-TABLE 5.5-
NUMBER OF PUBLIC SCHOOL TEACHERS AND STUDENT-TEACHER RATIOS, 1968-69 THROUGH 1974-1975

ITEM	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
NUMBER OF TEACHERS	71	70	67	72	81	85	113
STUDENT-TEACHER RATIO	18.2	19.0	20.1	19.4	17.6	18.8	15.6

SOURCES: TABLE 5.3 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, VOL I, CHAP OF THE POP, PT 28, MONTANA
TABLE 5.4 US BUR OF THE CENSUS, COUNTY AND CITY DATA BOOK, 1952, 1962, 1972
TABLE 5.5 COMPUTED FROM MONTANA SCHOOL STATISTICS

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6. HEALTH AND VITAL STATISTICS

-TABLE 6.1-
BIRTHS, DEATHS, MARRIAGES, AND MARITAL DISSOLUTIONS, 1970 THROUGH 1974

ITEM	1970	1971	1972	1973	1974
BIRTHS	166	179	142	160	192
DEATHS	81	70	61	75	80
MARRIAGES	55	42	52	54	57
MARITAL DISSOLUTIONS	18	26	25	23	27

-TABLE 6.2-
BIRTH, DEATH, MARRIAGE AND MARITAL DISSOLUTION RATES, 1970 THROUGH 1974

RATES (PER 1000 POPULATION)	1970	1971	1972	1973	1974
BIRTH	27.52	23.25	20.58	25.00	31.48
DEATH	13.43	9.09	8.84	11.72	13.11
MARRIAGE	9.12	5.45	7.54	8.44	9.34
MARITAL DISSOLUTION	2.98	3.64	3.62	3.59	4.43

-TABLE 6.3-
MARITAL STATUS OF ALL PERSONS, 14 YEARS OLD AND OLDER, 1970

ITEM	TOTAL	MALE	FEMALE
NEVER MARRIED	1067	650	417
MARRIED	2587	1300	1287
SEPARATED	50	24	26
WIDOWED	323	74	249
DIVORCED	129	67	62

SOURCES: TABLE 6.1 STATE DEPT OF HEALTH & ENVIRONMENTAL SCIENCES, MONTANA VITAL STATISTICS (ANNUAL)
TABLE 6.2 COMPUTED FROM MONTANA VITAL STATISTICS AND POPULATION ESTIMATES (TABLE 1.4)
TABLE 6.3 US BUR OF THE CENSUS, US CENSUS OF POP: 1970, FIRST COUNT SUMM COMPUTER TAPES (PROCESSED) MONTANA DEPT CA

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ROSEBUD COUNTY

7. AGRICULTURE

-TABLE 7.1-
NUMBER OF FARMS, ACRES AND AVERAGE SIZE, 1969

	TOTAL FARMS	LAND IN FARMS	AVERAGE SIZE OF FARMS	COUNTY AREA	PERCENT OF LAND IN FARMS
COUNTY	390	2963025	7598	3223424	91.9%

-TABLE 7.2-
NUMBER OF FARMS BY TYPE OF PRODUCTS REPORTED, 1969

	CATTLE AND CALVES	HOGS	SHEEP	CHICKENS	MILK COWS	HORSES	CORN	WHEAT
NUMBER	331	34	41	74	99	219	50	146

-TABLE 7.3-
NUMBER OF FARMS BY ECONOMIC CLASS, 1969

	CLASS 1 $40000 & OVER	CLASS 2 $20000 -$39999	CLASS 3 $10000 -$19999	CLASS 4 $5000 -$9999	CLASS 5 $2500 -$4999	CLASS 6 $50- $2499	PART TIME	PART RETIRE	ABNORMAL
NUMBER	82	81	76	62	39	15	21	13	1

SOURCES: TABLE 7.1 US BUR OF THE CENSUS, CENSUS OF AG: 1969 (MONTANA AGRICULTURAL STATISTICS, VOL XIV)
TABLE 7.2 IBID
TABLE 7.3 IBID

JUNE 1975

PROFILES/AGRICULTURE/7.1,7.2,7.3

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FERGUS COUNTY

7. AGRICULTURE

TABLE 7.4
CASH RECEIPTS FROM SALE OF PRINCIPAL PRODUCTS AND GOVERNMENT PAYMENTS, 1970, 1971, 1972, AND 1973

YEAR	LIVESTOCK AND PRODUCTS	CROPS	RECEIPTS FROM MARKETING	GOVERNMENT PAYMENTS	ALL CASH RECEIPTS	CASH RECEIPTS PER FARM
1970	8810800	2279200	11090000	883000	11973000	28900
1971	10905200	1789400	12694600	698000	13392600	33232
1972	12664500	2499500	15164000	847200	16011200	40128
1973	15075400	4475500	19550900	462000	20012900	50923

-TABLE 7.5-
ALL CROPS, IRRIGATED AND NOT IRRIGATED, ACRES HARVESTED AND VALUE OF CROP PRODUCTION, 1970, 1971, 1972, AND 1973

YEAR	IRRIGATED		NOT IRRIGATED	
	ACRES HARVESTED	VALUE OF CROP PRODUCTION	ACRES HARVESTED	VALUE OF CROP PRODUCTION
1970	26900	2032900	51000	1218600
1971	26860	2009700	52600	1566400
1972	33055	3045000	43000	1967600
1973	36080	6135000	49000	4367400

SOURCES: TABLE 7.4 MONTANA DEPT OF AG AND US DEPT OF AG, SRS, MONTANA AGRICULTURAL STATISTICS, VOL XIV, CC STATISTICS 1970-197
TABLE 7.5 IBID

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FORSYTH COUNTY

8. LAND AND WATER USE

-TABLE 8.1-
LAND USE IN ACRES, 1967

CLASSIFICATION	ACRES	% OF TOTAL
TOTAL LAND AREA	3220480	100.0%
FEDERAL NON-CROPLAND	337995	10.5%
URBAN AND BUILT-UP	5208	0.2%
SMALL WATER AREAS	3104	0.1%
AGRICULTURE	2874173	89.2%
CROPLAND	128303	4.0%
PASTURE	27388	0.9%
RANGE	2483906	77.1%
FOREST	220690	6.9%
OTHER	13856	0.4%

-TABLE 8.2-
LAND IN FARMS BY MAJOR USE, 1969

CLASSIFICATION	ACRES	% OF TOTAL
LAND IN FARMS	2963025	100.0%
CROPLAND	148158	5.0%
HARVESTED	89964	3.0%
PASTURED	14894	0.5%
ALL OTHER	43300	1.5%
WOODLAND	15523	0.5%
ALL OTHER LAND	2799344	94.5%

SOURCES: TABLE 8.1 MONTANA STATE CONSERVATION NEEDS COMMITTEE, MONTANA SOIL AND WATER CONSERVATION NEEDS INVENTORY, 1970
TABLE 8.2 US BUR OF THE CENSUS, CENSUS OF AG: 1969 (MONTANA AGRICULTURAL STATISTICS, VOL XIV)

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ROSEBUD COUNTY

8. LAND AND WATER USE

-TABLE 8.2-
LAND USE, IRRIGATION, PASTURELAND, RANGELAND, AND CONSERVATION, 1969

	IRRIGATED LAND IN FARMS		FARMS WITH SALE OF PRODUCTS OVER $2500		
	FARMS	ACRES	PASTURE AND RANGELAND	LAND IN STRIP CROPPING	LAND IN SUMMER FALLOW
COUNT	137	34993	2505722	20463	37919

-TABLE 8.4-
AVERAGE WATER USE FOR IRRIGATION

	ACRES FULL SERVICE	ACRES PARTIAL SERVICE	ACRES FULL EQUIVALENT	DIVERSION REQUIREMENT (ACRES-FEET/YEAR)	NET DEPLETION (ACRES-FEET/YEAR)	RETURN FLOW (ACRES-FEET/YEAR)
COUNT	22338	5038	24857	158649	74803	83846

SOURCES: TABLE 8.3 US BUR OF THE CENSUS, CENSUS OF AG: 1969 (MONTANA AGRICULTURAL STATISTICS, VOL XIV)
TABLE 8.4 WATER USE IN MONTANA, NO 13, DEPT OF NAT RES, 1975

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ROSEBUD COUNTY

9. REVENUE

-TABLE 9.1-

ACRES AND ASSESSED VALUE OF IRRIGATED AND NON-IRRIGATED TILLABLE LANDS, 1970 TO 1974

	1970	1971	1972	1973	1974
IRRIGATED					
ACRES	23647	23871	24136	23111	23572
VALUE (DOLLARS)	775970	779640	783250,	776280	774710
AVERAGE VALUE	32.81	32.67	32.45	33.59	32.87
NON-IRRIGATED					
ACRES	82219	82784	81803	83842	92362
VALUE (DOLLARS)	982530	992050	976990	995050	1015570
AVERAGE VALUE	11.95	11.98	11.94	11.87	11.00

-TABLE 9.2-

ACRES AND ASSESSED VALUE OF GRAZING AND WILD HAY LANDS, 1970 TO 1974

	1970	1971	1972	1973	1974
GRAZING LAND					
ACRES	2326039	2324556	2326480	2320482	2311370
VALUE (DOLLARS)	5528040	5521290	5534900	5522030	5485520
AVERAGE VALUE	2.38	2.38	2.38	2.38	2.37
WILD HAY LAND					
ACRES	6320	6274	6164	6158	11303
VALUE (DOLLARS)	55990	55810	55360	55720	73630
AVERAGE VALUE	8.86	8.90	8.98	9.05	6.51

SOURCES: TABLE 9.1 REPORT OF THE MONTANA DEPARTMENT OF REVENUE, 1970 TO 1974
TABLE 9.2 IBID

ROSEBUD COUNTY

9. REVENUE

-TABLE 9.3-

TOTAL OF ALL LANDS, ASSESSED VALUE AND IMPROVEMENTS, 1970 TO 1974

	1970	1971	1972	1973	1974
ALL LANDS					
ACRES	2438687	2438015	2439083	2434456	2439309
VALUE (DOLLARS)	7513767	7521632	7542886	7526092	7627212
AVERAGE VALUE	3.08	3.09	3.09	3.09	3.13
IMPROVEMENTS	2683330	2756130	2842040	3239270	3861490

-TABLE 9.4-

ASSESSED AND TAXABLE PROPERTY VALUATION, 1970 TO 1974

	1970	1971	1972	1973	1974
ASSESSED VALUE	38491349	40860597	46536352	51698140	72282308
TAXABLE VALUE	1251543C	13709670	18121757	19612993	25666296

SOURCES: TABLE 9.3 REPORT OF THE MONTANA DEPT OF REVENUE, 1970 TO 1974
TABLE 9.4 IRIO

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MISSOULA COUNTY

9. REVENUE

-TABLE 9.7-

TOTAL PROPERTY TAXES BILLED FOR PUBLIC SERVICES, FY 1970 TO FY 1975

	FY 1970	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975
TOTAL PROPERTY TAXES	1617156	1871154	2037478	2472111	2549725	3540890
COUNTY PURPOSE TAXES	497071	573726	713597	825497	880010	912961
PUBLIC SCHOOL TAXES	847410	999710	1025999	1320032	1634014	2136064
CITY AND TOWN TAXES	85375	91452	103527	109915	140696	180110
STATE PROPERTY TAXES	102283	121551	107422	129486	193897	205911
MISCELLANEOUS TAXES	84563	84715	86933	87181	100906	106444

-TABLE 9.8-

MILL LEVIES FOR COUNTY OPERATIONS, FY 1971 TO FY 1974

	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975
TOTAL MILLS	46.91	54.55	45.44	45.54	34.38
GENERAL FUND	16.23	18.57	12.42	16.31	9.52
ROAD	12.00	13.40	10.56	11.93	9.99
BRIDGE	4.00	5.00	4.23	3.91	3.99
POOR	5.46	5.25	7.92	4.65	3.80
EXTENSION AGENT	0.0	0.0	0.0	0.0	0.0
FAIR	1.42	1.25	0.89	0.79	0.99
LIBRARY	2.96	1.61	1.25	1.27	1.01
AIRPORT	0.10	0.27	1.85	1.53	1.56
CEMETERY	0.50	0.47	0.47	0.31	0.40
DEBT LEVY	0.25	5.47	3.44	3.03	2.25
OTHER	1.97	3.30	2.41	2.21	1.06

SOURCES: TABLE 9.7 MONTANA PROPERTY TAXATION, 1969 TO 1975, MONT TAXPAYERS ASSOCIATION
TABLE 9.8 IBID

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JUD COUNTY

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-TABLE 10.1-

NUMBER OF BENEFICIARIES OF OLD AGE, SURVIVORS, DISABILITY AND HEALTH INSURANCE, BY TYPE, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL	812	810	811	855	865
RETIRED WORKERS	385	385	379	405	400
DEPENDENTS	89	80	81	95	85
DISABLED WORKERS	39	41	47	50	45
DEPENDENTS	28	41	37	35	50
SURVIVORS	259	252	260	265	280
SPECIAL AGE 72 BENEFICIARIES	12	11	7	5	5

-TABLE 10.2-

AMOUNT ($000) OF MONTHLY BENEFITS PAID TO BENEFICIARIES OF OLD AGE, SURVIVORS, DISABILITY AND HEALTH INSURANCE, BY TYPE, 1970 TO 1974

	1970	1971	1972	1973	1974
TOTAL (THOUSANDS OF DOLLARS)	69	76	93	104	116
RETIRED WORKERS	42	46	55	61	67
DISABLED WORKERS	4	5	7	9	9
ALL OTHER BENEFICIARIES	23	25	31	34	42

CES: TABLE 10.1 PUBLICATION RS:S-2.13, DEPARTMENT OF HEW
TABLE 10.2 1810

ILES/SOCIAL WELFARE STATISTICS/10.1,10.2

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